

SS200-AH-MMM-010

**TECHNICAL MANUAL
FOR
NAVY SHIPBOARD
COLLECTIVE PROTECTION SYSTEM
(CPS)
ALARM SYSTEM
OPERATION AND MAINTENANCE**



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PREFACE

The anticipated use of chemical, biological, and radiological (CBR) weapons against Navy ships has reinforced the need to provide better defensive measures to protect personnel and vital ship spaces from toxic chemical and biological agents and radioactive fallout. The Navy Shipboard Collective Protection System (CPS) provides CBR protection to designated shipboard zones.

This equipment manual provides operation and maintenance instructions for the alarm system used with CPS. The equipment described in this manual has been developed and tested by the Naval Surface Warfare Center and approved by the Naval Sea Systems Command. In certain instances, where prior contractual arrangements did not permit the use of this Navy-designed hardware, actual shipboard equipment may be different. When such deviations exist, the manuals for that equipment should be referenced. Nevertheless, the purpose and function of such equipment should be similar to that described herein. For a more detailed account of CPS operations, refer to the system description, operation and maintenance manual, SS200-AF-MMM-010.

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the high voltage supply turned on. Under certain conditions dangerous potentials may exist when the power control is in the off position, due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery.

The following warnings appear in the text in this volume and are repeated here for emphasis.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures. (pages 6-11, 6-14, 6-15, and 6-17)

WARNING

AC power is supplied to the master panel when the ship's breaker is on. Be careful not to make contact with the circuit card or terminals two (2), three (3), four (4), or five (5) on terminal board TB4. (pages 6-11 and 6-13)

WARNING

Power is supplied to the zone sensor box during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures. (page 6-17)

WARNING

Power is supplied to the slave panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures. (page 6-18)

CHAPTER 1

GENERAL INFORMATION AND SAFETY PRECAUTIONS

1-1 SAFETY PRECAUTIONS.

Personnel involved with the use and maintenance of the Collective Protection System (CPS) Alarm System must comply with the safety precautions included in this manual. The Safety Summary provides general safety precautions, as well as specific precautions contained elsewhere in this manual.

1-2 INTRODUCTION.

The anticipated use of chemical, biological, and radiological (CBR) weapons against Navy ships has reinforced the need to provide better defensive measures to protect personnel and vital ship spaces from toxic chemicals, biological agents and radioactive fallout. The Navy Shipboard CPS was initiated to provide this CBR protection.

This manual provides users with instructions for operating and maintaining the alarm system used within CPS total protection (TP) zones. The information includes physical and functional descriptions of the alarm system, instructions for its use, and procedures for performing scheduled and corrective maintenance at the organizational level.

Information concerning the CPS alarm system installation can be found in the Ship's Information Book (SIB), Heating, Ventilation, and Air Conditioning (HVAC) section, or in the *General Specifications for Ships of the US Navy* (1989), Section 512, HVAC.

1-3 EQUIPMENT DESCRIPTION.

CPS provides filtered air to designated shipboard zones to protect against CBR contamination. To ensure the air remains free from CBR contaminants, the TP zone is pressurized to prevent unfiltered air from entering the zone through leaks at the zone boundary.

The CPS Alarm System (figure 1-1) monitors overpressure in each TP zone using both local

and remote indicators to apprise ship's personnel of the level of CPS overpressure.

Because the number of TP zones differs from ship to ship, the configuration of the CPS Alarm System will vary. Each alarm system can monitor the status of as many as five zones. This manual is written for a five zone system and all illustrations show five zones. The CPS Alarm System consists of a master panel, a slave panel, a zone sensor box in each zone, a static air probe, and a terminal box.

1-3.1 Master Panel. The master panel is located in Damage Control Central (DCC) and is the main display panel for monitoring the overpressure in each TP zone. The master panel contains a meter and three indicator lamps per TP zone, up to a maximum of five zones. It also contains a DC power supply and circuit card assembly. The master panel is interconnected to the slave panel and zone sensor boxes.

1-3.2 Slave Panel. The slave panel is located in the pilot house and has a lamp for each TP zone. The lamps are controlled by the master panel and light when overpressure is below 0.4 in. wg. The slave panel is interconnected to the master panel.

1-3.3 Zone Sensor Box. A zone sensor box is located in each TP zone to measure and monitor the pressure level in that zone. A pressure transducer assembly in the sensor box measures zone pressure and sends a signal to the master panel. A differential pressure gauge on the front of the zone sensor box displays zone pressure. The zone sensor box is interconnected to the master panel and to the static air probe.

1-3.4 Static Air Probe. The static air probe is mounted outside the TP zone in an area where it is subjected to ambient air pressure. The probe is connected through a network of tubing to each zone sensor box and provides the reference pressure to the pressure transducer assembly and gauge. More than one static air probe may be used when distances between zone sensor boxes

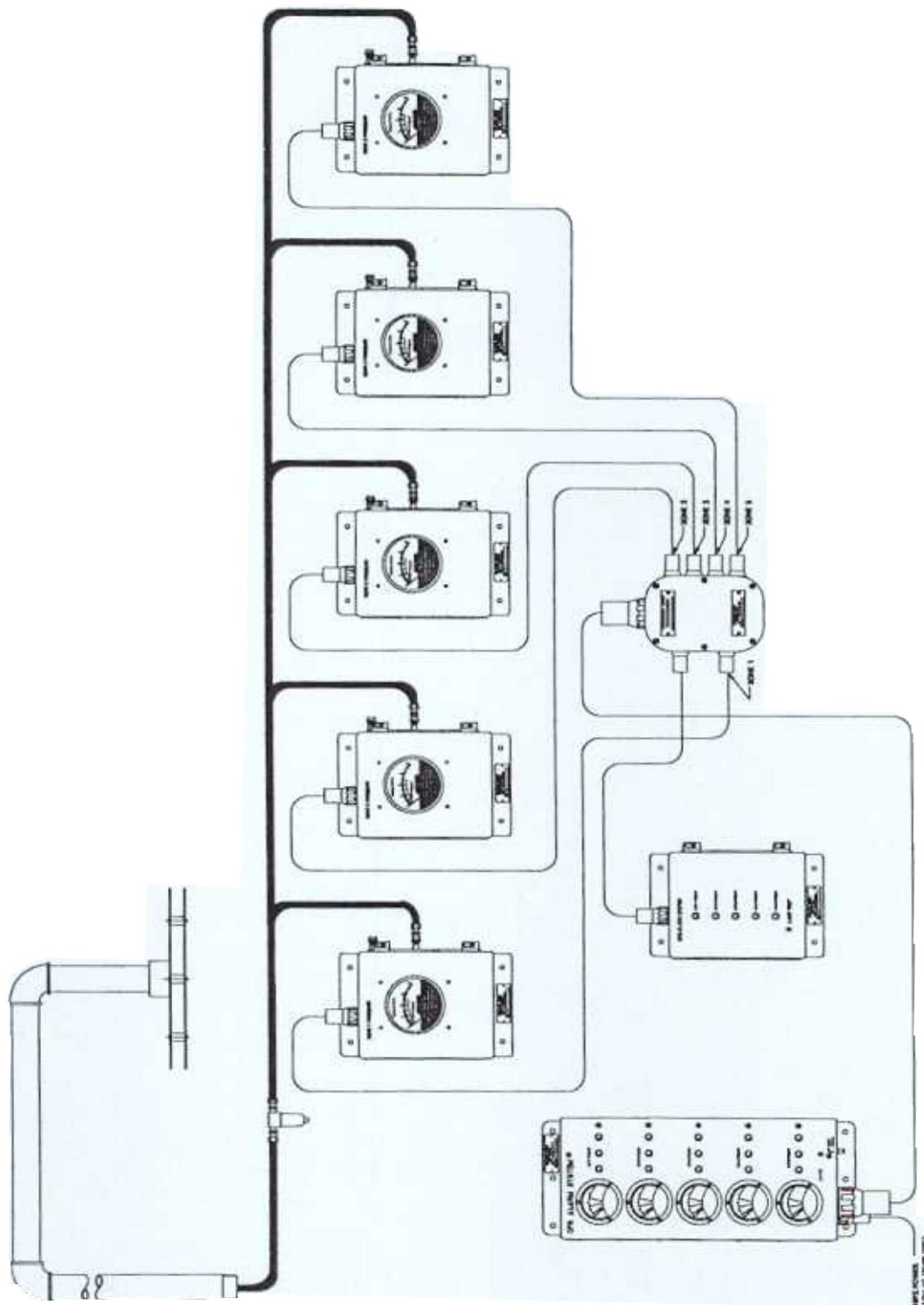


Figure 1-1. Alarm System Assembly

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CHAPTER 2

OPERATION

2-1 INTRODUCTION.

The Collective Protection System (CPS) Alarm System is used in total protection (TP) zones to monitor zone overpressure. During normal CPS operation, an overpressure of 2.0 ± 0.5 in. wg above atmospheric pressure is maintained to prevent unfiltered air from entering the zone. The CPS Alarm System monitors this overpressure at all times. Alarm system indicators provide a visual indication of zone pressure status and warn ship's personnel of low zone pressure so that corrective action may be taken if necessary.

2-2 CONTROLS AND INDICATORS.

Operator controls for the alarm system consist of a circuit breaker on the bottom of the master panel and lamp test switches on the master and slave panels. The indicators for the system are meters, gauges and lamps on the master panel, slave panel, and zone sensor box as shown in table 2-1.

2-2.1 Master Panel Controls and Indicators.

2-2.1.1 Circuit Breaker. An ac power circuit breaker, CB1, is on the bottom of the master panel (figure 2-1). This breaker serves as an on/off switch. The breaker should be pushed in (power on) at all times unless maintenance procedures require that the system be turned off.

2-2.1.2 Zone Pressure Indicator Lamps. For each TP zone, three indicator lamps are installed on the front of the master panel. These

lamps are colored green, yellow, and red, to provide a visual means for monitoring zone pressure status. When lit, green indicates normal zone pressure; yellow, deficient zone pressure; and red, zone pressure low.

2-2.1.3 Zone Pressure Meter. A meter is located to the left of each set of indicator lamps (figure 2-1). Each meter ranges from 0-4 in. wg and is divided into three colored regions that correspond to the lamp colors (table 2-1).

2-2.1.4 Lamp Test Pushbutton. A lamp test pushbutton is located on the front of the master panel. Pressing this button lights all lamps, as a check for burned out bulbs.

2-2.2 Slave Panel Controls and Indicators.

2-2.2.1 Zone Pressure Indicator Lamps. The slave panel (figure 2-2) contains one red indicator lamp for each TP zone. This lamp lights when the corresponding red lamp on the master panel is lit.

2-2.2.2 Lamp Test Pushbutton. A lamp test pushbutton is located on the front of the slave panel. Pressing this button lights all lamps, as a check for burned out bulbs.

2-2.3 Zone Sensor Box. A pressure sensor box (figure 2-3) is located in each TP zone. The only operator indicator is a differential pressure gauge. Each gauge ranges from 0-4 in. wg and is divided into three colored regions that correspond to the lamp colors, as shown in table 2-1.

Table 2-1 CPS Alarm System Indicators* (per TP Zone)

	Red Lamp	Yellow Lamp	Green Lamp	Meter/Gauge
Master Panel	0 - 0.4	0.4 - 1.5	1.5 - 2.5	0 - 4.0
Slave Panel	0 - 0.4	N/A	N/A	N/A
Zone Sensor Box	N/A	N/A	N/A	0 - 4.0

* Operating ranges shown are in. wg.

are too great to permit a cost-effective pneumatic link of reference pressure ports.

1-3.5 Terminal Box. A terminal box, conveniently located between all units, is used for electrical connections.

REFERENCE DATA.

Reference data are provided in table 1-1.

Table 1-1. Reference Data

Input Power	110V/60Hz ac
Internal Power	12 Vdc
Pressure Range	0-4 in. wg

EQUIPMENT, ACCESSORIES, DOCUMENTS SUPPLIED.

Table 1-2 lists the units included as part of the CPS Alarm System. No accessories or additional documentation is provided.

Table 1-2. Equipment Supplied

Qty	Item Name	Dimensions (LxWxH)	Weight
1-5*	Zone Sensor Box	8.0"x4.5"x13.0"	10 lbs
1-5*	Static Air Probe	Variable	Variable
1	Master Panel	9.2"x9.0"x23.5"	29 lbs**
1	Slave Panel	8.0"x4.5"x13.0"	8 lbs
1	Terminal Box	9.0"x6.0"x5.5"	8 lbs

* Quantity varies from 1 to 5 units, depending on the number of TP zones to be monitored.

** Weight shown is for a five zone master panel.

1-6 SUPPORTING COMPONENTS.

CPS Alarm System components are mounted to the bulkhead; they do not require any special controls or mounting devices other than standard hardware. Table 1-3 provides a list of publications pertaining to CPS operation and maintenance.

Table 1-3. Reference Publications

Publication Number	Title
SS200-AF-MMM-010	Navy Shipboard Collective Protection System (CPS) Technical Manual System Description, Operation, and Maintenance
SS200-AG-MMM-010	Navy Shipboard Collective Protection System (CPS) Technical Manual, CBR Filter System Operation and Maintenance
SS200-AJ-MMM-010	Navy Shipboard Collective Protection System (CPS) Technical Manual, Pressure Control Valve (PCV) Operation and Maintenance
SS200-AK-MMM-010	Navy Shipboard Collective Protection System (CPS) Technical Manual, Decontamination Station Operation and Maintenance

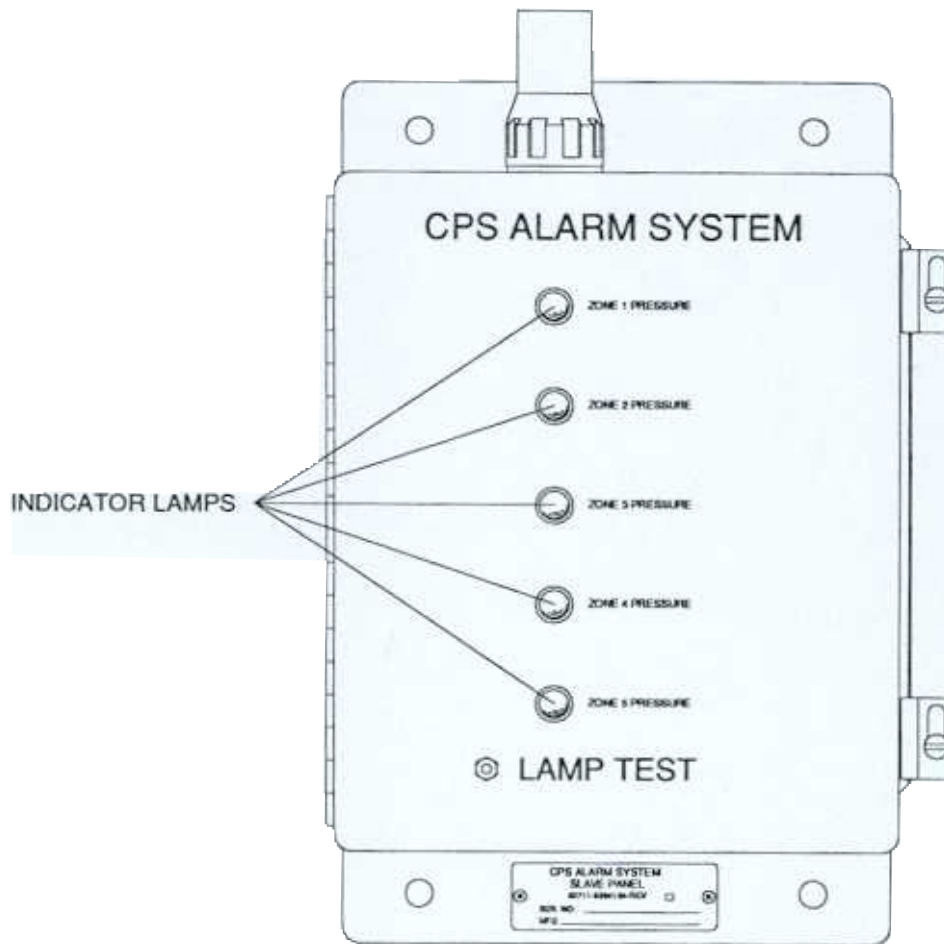


Figure 2-2. Slave Panel

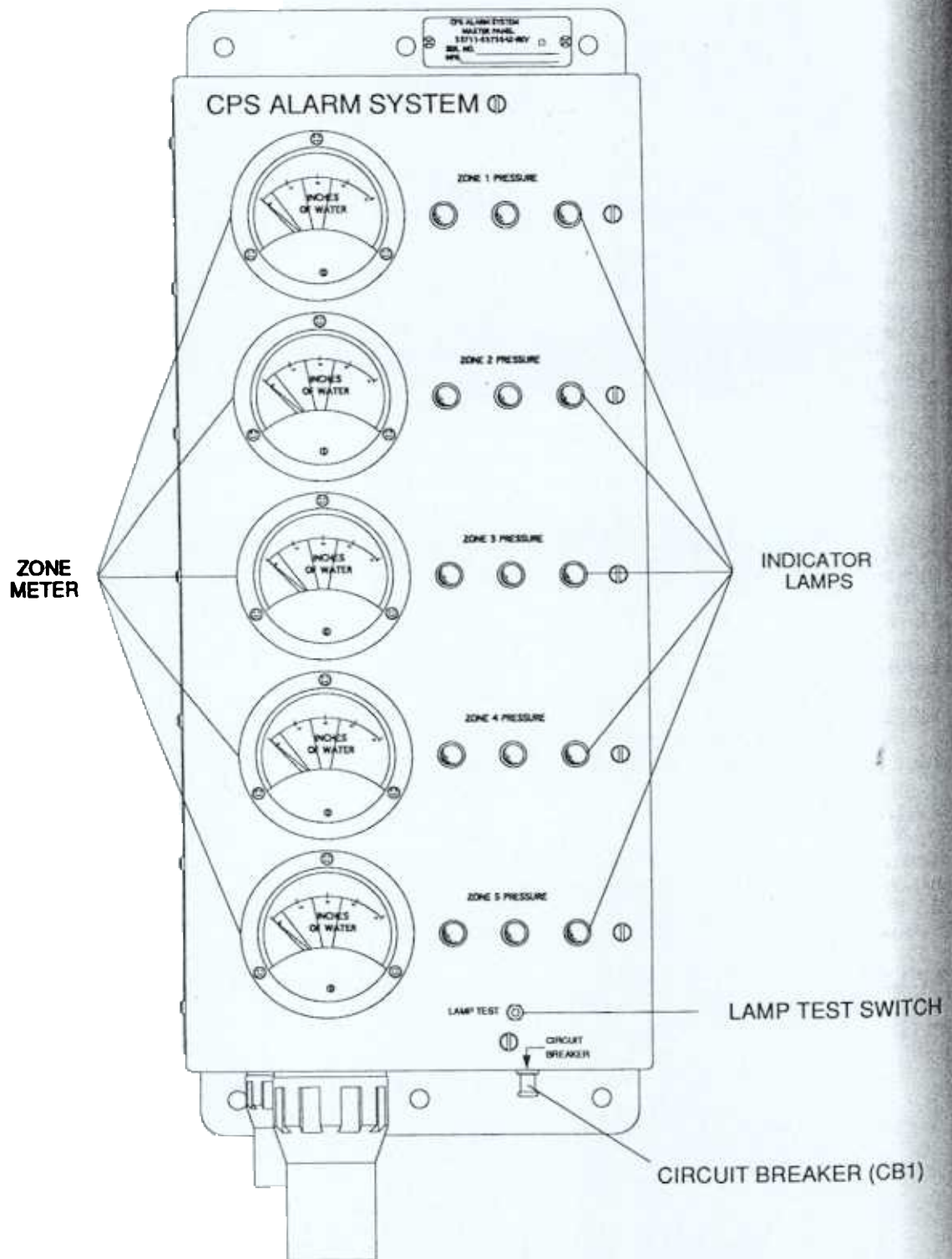


Figure 2-1. Master Panel

2-3 NORMAL OPERATION.

CPS TP zones are designed for continuous operation with pressure maintained at 2.0 ± 0.5 in. wg above atmospheric. Under certain circumstances, it may be desirable to operate a TP zone without pressurization by opening one or more zone boundary accesses. Normal system operation includes both pressurized and unpressurized operation.

2-3.1 Operation with Pressurized TP Zone.

Since the CPS Alarm System displays TP zone pressure at all times, there is no difference in operation between the pressurized and unpressurized conditions except for the level of pressure displayed. With the zone fully pressurized to a level of 2.0 ± 0.5 in. wg, the green lamp on the master panel will be lit and the meter will display the level of zone pressure within the green region. Should zone pressure fall, the master panel meter and lights will respond accordingly. Should the pressure fall below 0.4 in. wg, the corresponding red light on the slave panel will also light. Low zone pressure is usually caused by the inadvertent opening of a zone boundary access or improper use of an air lock. Damage Control Central (DCC) personnel should monitor the master panel and notify the Officer of the Deck if zone pressure falls into the red region.

2-3.2 Operation with Unpressurized TP Zone. When a TP zone is operated in an unpressurized condition, the CPS Alarm System master panel meter will indicate low/no pressure (red region) and the corresponding red lamps on the master panel and slave panel will be lit.

2-4 EMERGENCY OPERATION.

Should the CPS Alarm System master panel become inoperable, pressure levels can be monitored using the zone pressure gauge on the zone sensor box in each zone. Monitoring personnel should notify DCC and the Officer of the Deck, via an established communication link, if zone pressure falls out of the green (normal) region.

2-5 OPERATOR'S MAINTENANCE INSTRUCTIONS AND SCHEDULES.

Watch personnel shall be required to check all lamps on the master and slave panels once each watch. This is accomplished by pressing the lamp test pushbutton on the front of the panel. Bulbs that do not light shall be replaced. If replacement does not solve the problem the operator shall advise maintenance personnel to perform corrective maintenance.

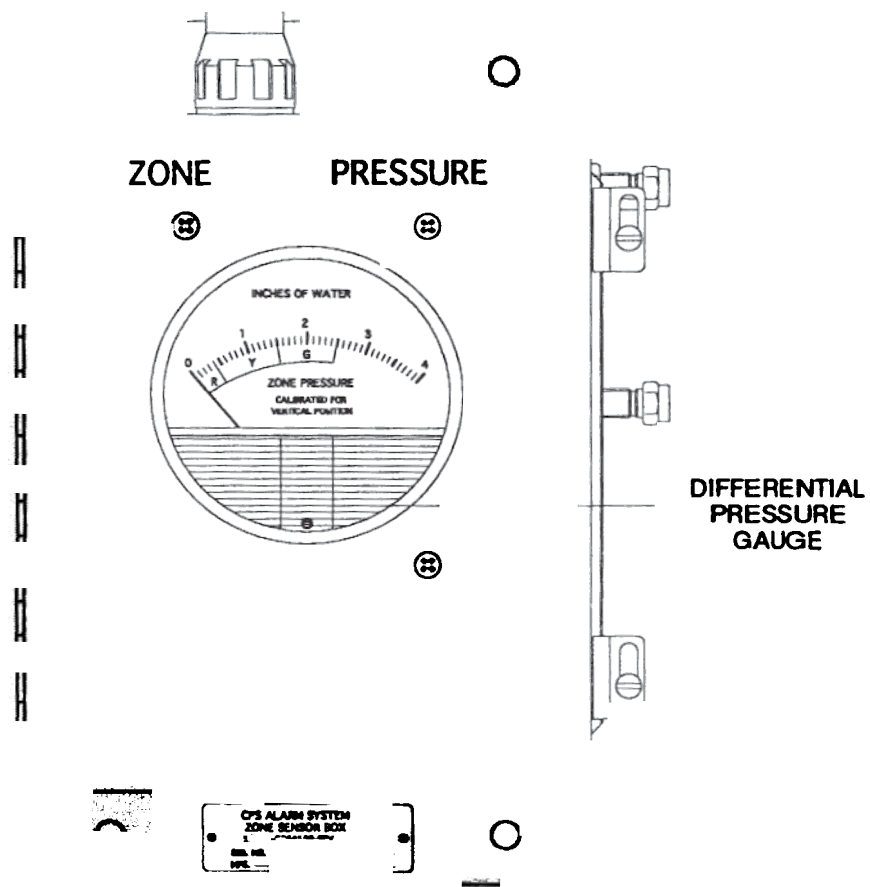


Figure 2-3. Zone Sensor Box

2-3 NORMAL OPERATION.

CPS TP zones are designed for continuous operation with pressure maintained at 2.0 ± 0.5 in. wg above atmospheric. Under certain circumstances, it may be desirable to operate a TP zone without pressurization by opening one or more zone boundary accesses. Normal system operation includes both pressurized and unpressurized operation.

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CHAPTER 3

FUNCTIONAL DESCRIPTION

3-1 INTRODUCTION.

This chapter describes how the Collective Protection System (CPS) Alarm System operates. It provides a functional description of major subassemblies, as well as an explanation of their interaction, as shown in figure 3-1.

3-2 FUNCTIONAL DESCRIPTION OF MAJOR SUBASSEMBLIES.

The CPS Alarm System contains five major subassemblies: master panel, slave panel, zone sensor box, static air probe, and terminal box. Each subassembly is illustrated in figure 1-1.

3-2.1 Master Panel. The master panel is located in Damage Control Central (DCC) and serves as the main alarm panel for monitoring the overpressure in each total protection (TP) zone. It uses both meters and lamps to indicate zone pressure levels. Colored lamps provide immediate visual indication of zone pressure levels, while the meters allow for trend monitoring. The master panel operates on 110V/60 Hz ac ship's power. It contains a power supply, which transforms voltage from ac to dc for powering alarm system subassemblies. A circuit card in the master panel processes pressure (voltage) signals returned from each zone sensor box and controls lamp sequencing and meter movements.

3-2.2 Slave Panel. The slave panel is located in the pilot house and uses a red indicator lamp for each zone to alert bridge personnel when zone pressure is too low to provide Chemical, Biological, and Radiological (CBR) protection. When overpressure in a TP zone falls below 0.4 in. wg, the lamp for that zone will light to warn personnel that overpressure is low or lost. Slave panel lamps are controlled by the master panel.

3-2.3 Zone Sensor Box. A zone sensor box is located in each TP zone to monitor the overpressure in that zone. A pressure transducer assembly inside the zone sensor box compares zone pressure with an ambient reference pressure from the static air probe and returns a voltage signal (proportional to zone pressure) to the master panel. A pressure gauge on the front of the zone sensor box displays zone pressure locally.

3-2.4 Static Air Probe. The static air probe is used to obtain an atmospheric pressure reference that is free from variations due to relative wind velocity. The probe is always located outside of CPS boundaries. A network of tubing connects the static air probe to each zone sensor box. In some instances, more than one static air probe may be used.

3-2.5 Terminal Box. The terminal box is used to make all electrical connections between the master panel, slave panel, and zone sensor boxes.

3-3 INTERACTION OF SUBASSEMBLIES.

Ship's 110V/60 Hz ac power enters the master panel, where it is transformed into dc voltage and then output to the pressure transducer assembly in each zone sensor box. The pressure transducer assembly compares zone overpressure to reference pressure from the static air probe and transmits a voltage signal proportional to zone pressure to the master panel. A circuit card in the master panel processes the voltage signal and controls lamp sequencing and meter movement. When a red lamp is energized on the master panel, an electrical signal is sent to the slave panel lighting the corresponding zone's red lamp. Interconnection between the subassemblies is through the terminal box.

CHAPTER 4

SCHEDULED MAINTENANCE

4-1 INTRODUCTION.

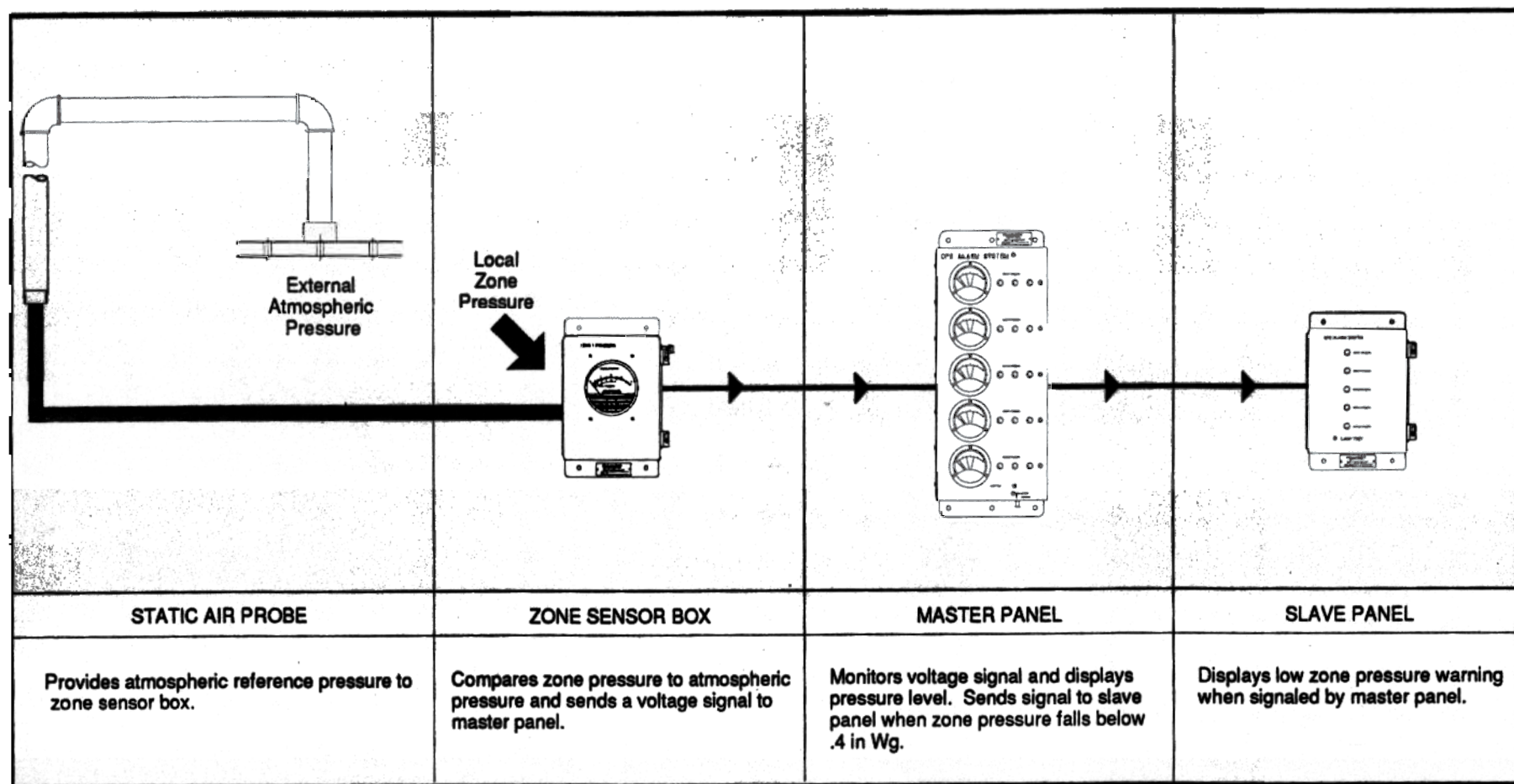
This chapter identifies scheduled maintenance actions for the Collective Protection System (CPS) Alarm System. The scheduled maintenance discussion in this manual does not duplicate instructions furnished in the Planned Maintenance System (PMS). Should there be any conflict, PMS documentation takes precedence. Any documentation conflicts should be reported immediately on the NAVSEA Technical Manual Deficiency/Evaluation Report (9086/10) located in the back of this manual.

4-2 MAINTENANCE PLAN.

Scheduled maintenance consists of organizational level inspections that identify and correct potential causes for alarm system failure or malfunction. Inspections may be conducted while the alarm system is operating. An alarm system meter/gauge/lamp test is conducted in conjunction with the Maintenance Requirement Card (MRC) for the total protection (TP) zone pressurization test. Inspection of the static air probe and the condensate drain bowl is detailed on an alarm system MRC.

4-2.1 Alarm System Meter/Gauge/Lamp Test. A meter, gauge, and lamp verification test is conducted to demonstrate the overall operation of the alarm system. The test ensures that when the master panel meter reading is in the green region, the corresponding indicator lamp is lit. It also ensures that the master panel meter reading is within 0.2 in. wg of the corresponding zone sensor box gauge. The verification test also includes a procedure for observing the sequencing of applicable master panel, slave panel, and zone sensor box meters, gauges, and lamps as zone pressure increases from normal atmospheric to a fully pressurized condition.



4-2.2 Static Air Probe and Condensate Drain Bowl Inspections. The static air probe is routinely inspected for external damage and any debris or foreign objects blocking the area between the disks. Accumulated condensate water is also removed from the condensate drain bowl. These actions are conducted to ensure that the zone sensor box receives a true measure of external atmospheric pressure.



SS200-AH-MMM-010

Figure 3-1. CPS Alarm System Component Functional Interaction

KEY

 Pneumatic Signal
 Electrical Signal

CHAPTER 5

TROUBLESHOOTING

5-1 INTRODUCTION.

This chapter provides troubleshooting procedures to help ship's crew identify malfunctions that might occur during operation and/or maintenance of the Collective Protection System (CPS) Alarm System. Since intermediate and depot level maintenance are not required for the alarm system, all troubleshooting procedures in this chapter are performed at the organizational level.

5-2 ORGANIZATIONAL LEVEL TROUBLESHOOTING PROCEDURES

Table 5-1 is a troubleshooting analysis chart for the Navy Shipboard CPS Alarm System. Use the chart to identify the problem and the probable cause of the problem, then perform the steps outlined under action.

Table 5-1 Trouble Analysis Chart

Symptoms	Probable Cause	Action	Reference
Master panel non-functional (lamps and meters do not work)	Missing ac/dc power	Quick ac/dc power test	6-3
	Missing ac/dc power	Test/restore ac/dc power	6-4
	Defective power supply assembly	Replace power supply assembly	6-5
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Master panel lamps operate but meter non-functional	Defective master panel meter	Test/replace master panel meter	6-8
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11

Symptoms	Probable Cause	Action	Reference
Master panel meter reading does not correspond to the zone pressure gauge	Flexible tubing in zone sensor box is damaged or kinked	Check tubing in sensor box for leaks or kinks	-
	Zone pressure gauge/master panel meter out of alignment	Align master panel meter	6-2
	Pressure gauge out of alignment or damaged	Test/repair zone sensor box	6-10
	Defective pressure transducer assembly in zone sensor box	Test/repair zone sensor box	6-10
	Defective wiring in zone sensor box	Test/repair zone sensor box	6-10
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defect in terminal box	Test/repair terminal box	6-12
	Defective ship's wiring	Test/repair ship's wiring	6-15
	Defective meter	Test/replace meter	6-8
	Defective circuit card	Test/replace circuit card	6-11
Slave panel does not operate although master panel is fully functional	Defective slave panel lamp test switch, lamp(s) wiring	Test/repair slave panel	6-13
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defect in terminal box	Test/repair terminal box	6-12
	Defective ship's wiring	Test/repair ship's wiring	6-15
	Defective circuit card	Test/replace circuit card	6-11

Symptoms	Probable Cause	Action	Reference
Master panel meter functional but one or more lamps do not operate	Defective lamp(s)	Test/replace lamps	6-9
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Slave panel lamp test switch does not light all lamps on slave panel	Defective lamp(s)	Test/replace lamps	6-9
	Defective lamp test switch or wiring	Test/replace lamp test switch/wiring	6-14
	Defect in terminal box	Test/repair terminal box	6-12
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Differential pressure gauge at zone sensor box inaccurate	Broken or kinked tubing	Check tubing in sensor box for leaks or kinks	-
	Static air probe obstructed	Clear probe	4-2
	Pressure gauge out of alignment or damaged	Test/repair zone sensor box	6-10
Master panel meter reading does not correspond with indicator lamps	Zone pressure gauge/master panel meter out of alignment	Align master panel meter	6-2
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective master panel meter	Test/replace master panel meter	6-8
	Defective circuit card	Test/replace master panel circuit card	6-11

CHAPTER 6

CORRECTIVE MAINTENANCE

SECTION ADJUSTMENTS AND ALIGNMENTS

6-1 INTRODUCTION.

This chapter provides corrective maintenance procedures to be performed at the organizational level. Intermediate and depot level maintenance is not required for the Collective Protection System (CPS) Alarm System. Section I provides procedures for aligning the alarm system meters and gauges. Section II provides procedures for repairing faults discovered following the troubleshooting analysis chart in Chapter 5 of this manual. Schematic diagrams are also provided at the end of this chapter for use as necessary. All corrective maintenance can be performed with the zone either pressurized or unpressurized unless otherwise specified.

6-2 ALARM SYSTEM ALIGNMENT.

Master panel meters and zone sensor box gauges are aligned in accordance with the procedures described below. No other adjustments or alignments are required for the CPS Alarm System.

Alignment of the alarm system meters and gauges is performed by three personnel: one located at the master panel in Damage Control Central; one with a hand pressure pump, located at the zone sensor box in the CPS zone; and one at the slave panel in the pilot house. The pressure gauge on the zone sensor box is considered the primary measurement device. The person located at the master panel coordinates the actions of the personnel located at the zone sensor box and slave panel. Reliable communication must be established between personnel before beginning alignment. Repeat procedure until all total protection (TP) zones are aligned.

- a. Components: master panel/zone sensor box/slave panel.
- b. Frequency: as required.
- c. Related maintenance: none.
- d. Maintenance task description: alarm system alignment.
- e. Safety precautions: potential for electrical shock.
- f. Tools, parts, materials, test equipment: straight blade screwdriver (3/16" to 1/4"

wide), jeweler's screwdriver, hand pressure pump (figure 6-9), tubing clamp or equivalent.

g. Procedure:

- (1) Position three personnel as indicated above.
- (2) At master panel ensure that the master panel circuit breaker CB1 (figure 6-1) is pushed in (on). Press and hold the lamp test switch on the master panel (figure 6.1). All lamps on the master panel should illuminate. If they do not, refer to troubleshooting (chapter 5). Release the lamp test switch after verifying the operation of the lamps.
- (3) Open front and inner panels of the master panel.
- (4) Open front panel of the zone sensor box. Disconnect the flexible tubing from the pressure gauge and the pressure transducer assembly noting its original configuration (figure 6-2). Observe the pressure reading of pressure gauge. If the pressure gauge does not indicate 0.0 in. wg pressure, adjust to read 0.0 by turning the adjustment screw on the face plate (figure 6-3). Adjust the screw slowly in either a clockwise or counter-clockwise direction. Leave the flexible tubing disconnected.
- (5) At the master panel, verify that all circuit card switches are in the NORM position (figures 6-4 and 6-5). Verify that the person at the zone sensor box has performed step (4).
- (6) At master panel, observe the master zone meter of the zone undergoing alignment. The desired zero pressure range is a meter reading equal to or greater than 0.0 but less than 0.1 inches pressure. If the zone meter does not indicate 0.0 pressure, adjust the meter to it's lowest reading (but no lower than 0.0) by turning the adjustment screw on it's face plate slowly either clockwise or counter-clockwise. If the meter cannot be mechanically adjusted to less than 0.1 inch pressure, adjust potentiometer

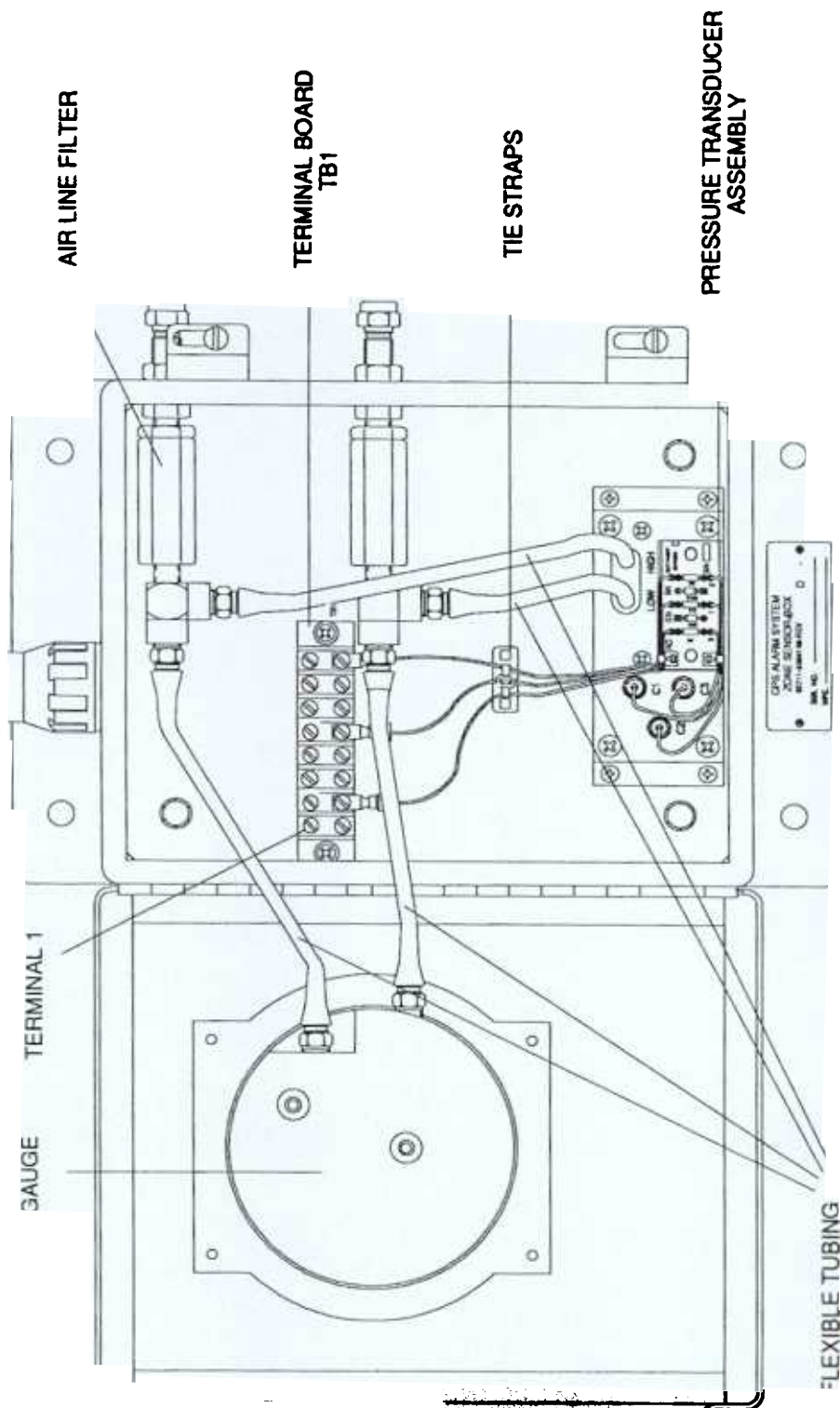


Figure 6-2. Zone Sensor Box, Door Open

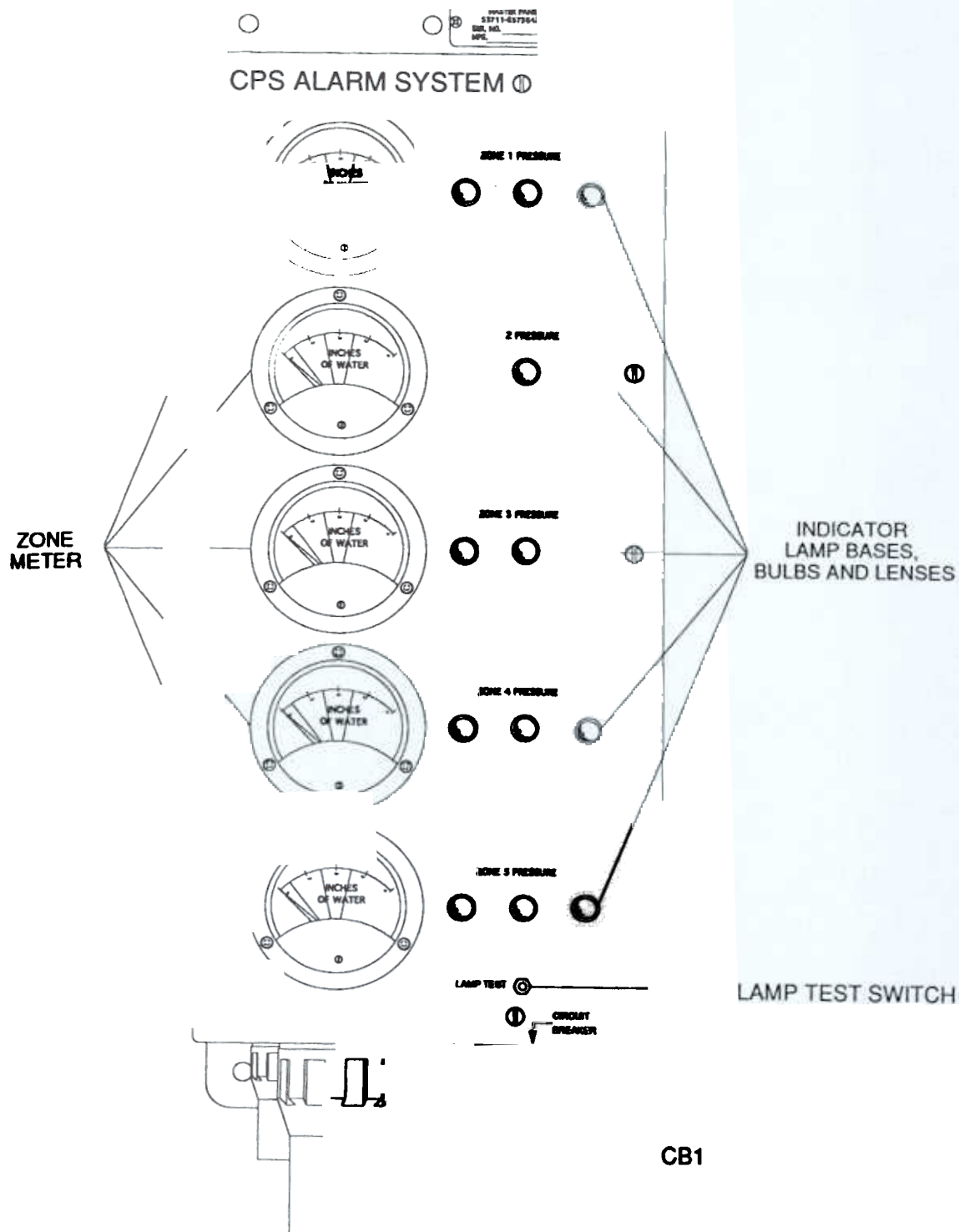


Figure 6-1. Master Panel

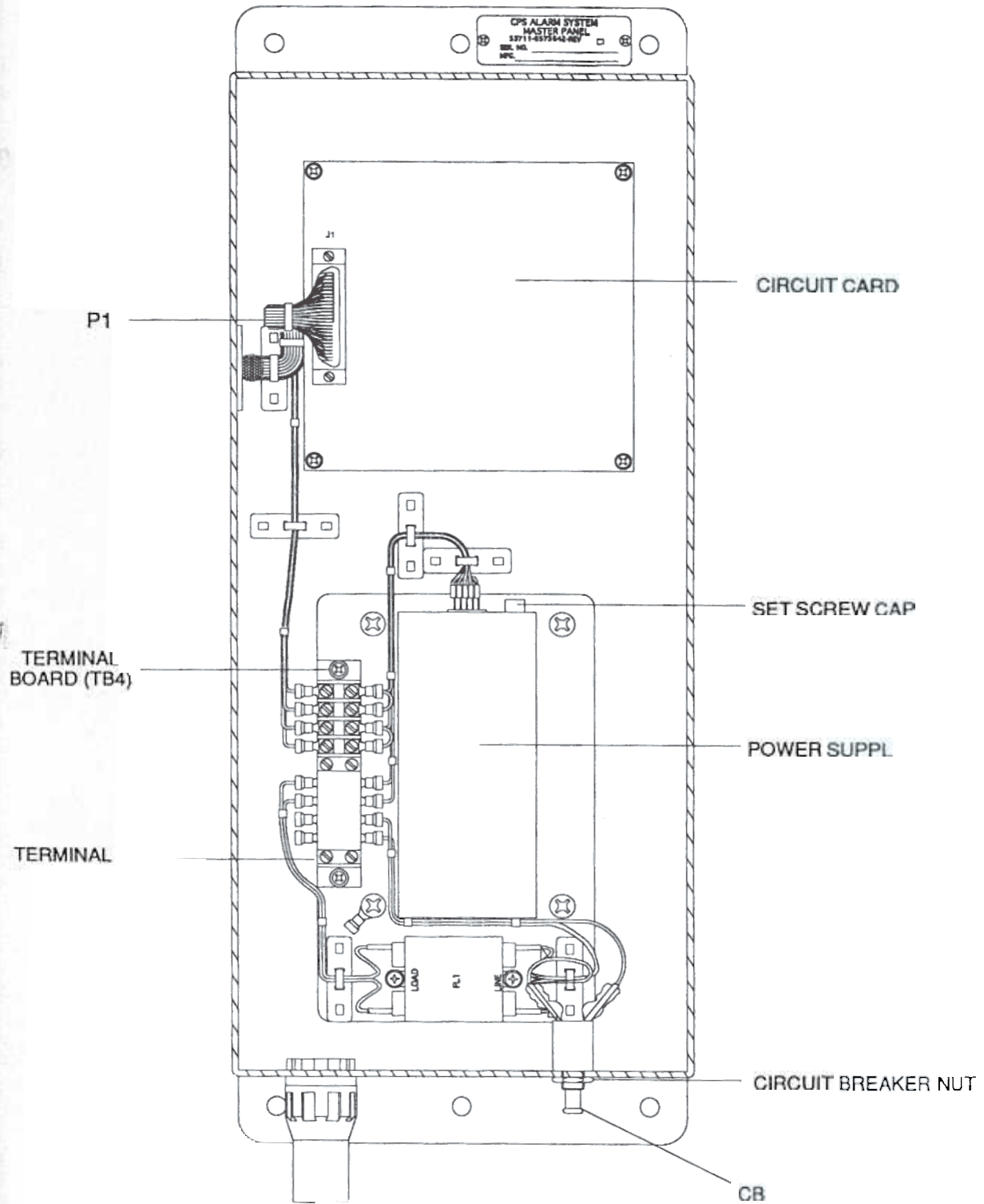


Figure 6-4 Master panel, Door Removed

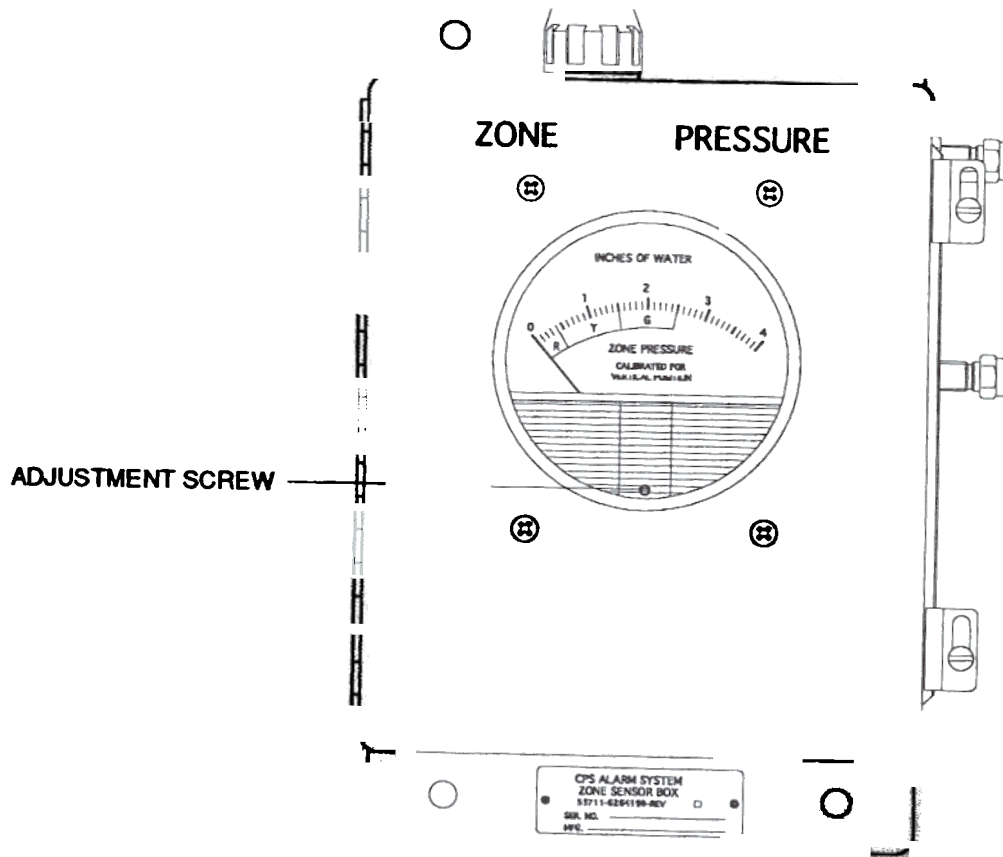


Figure 6-3. Zone Sensor Box

2-3 NORMAL OPERATION.

CPS TP zones are designed for continuous operation with pressure maintained at 2.0 ± 0.5 in. wg above atmospheric. Under certain circumstances, it may be desirable to operate a TP zone without pressurization by opening one or more zone boundary accesses. Normal system operation includes both pressurized and unpressurized operation.

2-3.1 Operation with Pressurized TP Zone.

Since the CPS Alarm System displays TP zone pressure at all times, there is no difference in operation between the pressurized and unpressurized conditions except for the level of pressure displayed. With the zone fully pressurized to a level of 2.0 ± 0.5 in. wg, the green lamp on the master panel will be lit and the meter will display the level of zone pressure within the green region. Should zone pressure fall, the master panel meter and lights will respond accordingly. Should the pressure fall below 0.4 in. wg, the corresponding red light on the slave panel will also light. Low zone pressure is usually caused by the inadvertent opening of a zone boundary access or improper use of an air lock. Damage Control Central (DCC) personnel should monitor the master panel and notify the Officer of the Deck if zone pressure falls into the red region.

2-3.2 Operation with Unpressurized TP Zone. When a TP zone is operated in an unpressurized condition, the CPS Alarm System master panel meter will indicate low/no pressure (red region) and the corresponding red lamps on the master panel and slave panel will be lit.

2-4 EMERGENCY OPERATION.

Should the CPS Alarm System master panel become inoperable, pressure levels can be monitored using the zone pressure gauge on the zone sensor box in each zone. Monitoring personnel should notify DCC and the Officer of the Deck, via an established communication link, if zone pressure falls out of the green (normal) region.

2-5 OPERATOR'S MAINTENANCE INSTRUCTIONS AND SCHEDULES.

Watch personnel shall be required to check all lamps on the master and slave panels once each watch. This is accomplished by pressing the lamp test pushbutton on the front of the panel. Bulbs that do not light shall be replaced. If replacement does not solve the problem the operator shall advise maintenance personnel to perform corrective maintenance.

CHAPTER 3

FUNCTIONAL DESCRIPTION

3-1 INTRODUCTION.

This chapter describes how the Collective Protection System (CPS) Alarm System operates. It provides a functional description of major subassemblies, as well as an explanation of their interaction, as shown in figure 3-1.

3-2 FUNCTIONAL DESCRIPTION OF MAJOR SUBASSEMBLIES.

The CPS Alarm System contains five major subassemblies: master panel, slave panel, zone sensor box, static air probe, and terminal box. Each subassembly is illustrated in figure 1-1.

3-2.1 Master Panel. The master panel is located in Damage Control Central (DCC) and serves as the main alarm panel for monitoring the overpressure in each total protection (TP) zone. It uses both meters and lamps to indicate zone pressure levels. Colored lamps provide immediate visual indication of zone pressure levels, while the meters allow for trend monitoring. The master panel operates on 110V/60 Hz ac ship's power. It contains a power supply, which transforms voltage from ac to dc for powering alarm system subassemblies. A circuit card in the master panel processes pressure (voltage) signals returned from each zone sensor box and controls lamp sequencing and meter movements.

3-2.2 Slave Panel. The slave panel is located in the pilot house and uses a red indicator lamp for each zone to alert bridge personnel when zone pressure is too low to provide Chemical, Biological, and Radiological (CBR) protection. When overpressure in a TP zone falls below 0.4 in. wg, the lamp for that zone will light to warn personnel that overpressure is low or lost. Slave panel lamps are controlled by the master panel.

3-2.3 Zone Sensor Box. A zone sensor box is located in each TP zone to monitor the overpressure in that zone. A pressure transducer assembly inside the zone sensor box compares zone pressure with an ambient reference pressure from the static air probe and returns a voltage signal (proportional to zone pressure) to the master panel. A pressure gauge on the front of the zone sensor box displays zone pressure locally.

3-2.4 Static Air Probe. The static air probe is used to obtain an atmospheric pressure reference that is free from variations due to relative wind velocity. The probe is always located outside of CPS boundaries. A network of tubing connects the static air probe to each zone sensor box. In some instances, more than one static air probe may be used.

3-2.5 Terminal Box. The terminal box is used to make all electrical connections between the master panel, slave panel, and zone sensor boxes.

3-3 INTERACTION OF SUBASSEMBLIES.

Ship's 110V/60 Hz ac power enters the master panel, where it is transformed into dc voltage and then output to the pressure transducer assembly in each zone sensor box. The pressure transducer assembly compares zone overpressure to reference pressure from the static air probe and transmits a voltage signal proportional to zone pressure to the master panel. A circuit card in the master panel processes the voltage signal and controls lamp sequencing and meter movement. When a red lamp is energized on the master panel, an electrical signal is sent to the slave panel lighting the corresponding zone's red lamp. Interconnection between the subassemblies is through the terminal box.

CHAPTER 4

SCHEDULED MAINTENANCE

4-1 INTRODUCTION.

This chapter identifies scheduled maintenance actions for the Collective Protection System (CPS) Alarm System. The scheduled maintenance discussion in this manual does not duplicate instructions furnished in the Planned Maintenance System (PMS). Should there be any conflict, PMS documentation takes precedence. Any documentation conflicts should be reported immediately on the NAVSEA Technical Manual Deficiency/Evaluation Report (9086/10) located in the back of this manual.

4-2 MAINTENANCE PLAN.

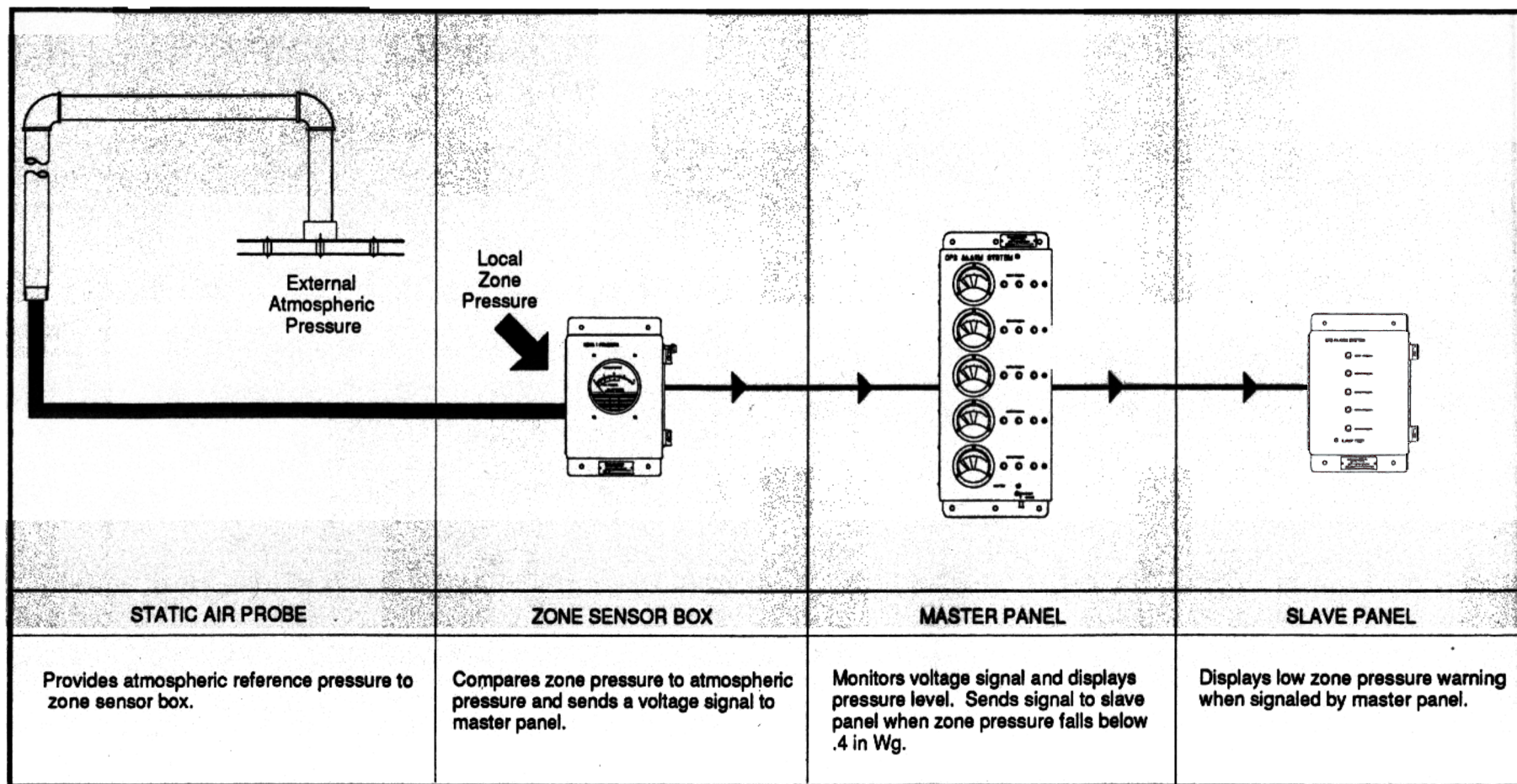
Scheduled maintenance consists of organizational level inspections that identify and correct potential causes for alarm system failure or malfunction. Inspections may be conducted while the alarm system is operating. An alarm system meter/gauge/lamp test is conducted in conjunction with the Maintenance Requirement Card (MRC) for the total protection (TP) zone pressurization test. Inspection of the static air probe and the condensate drain bowl is detailed on an alarm system MRC.

4-2.1 Alarm System Meter/Gauge/Lamp Test.

A meter, gauge, and lamp verification test is conducted to demonstrate the overall operation of the alarm system. The test ensures that when the master panel meter reading is in the green region, the corresponding indicator lamp is lit. It also ensures that the master panel meter reading is within 0.2 in. wg of the corresponding zone sensor box gauge. The verification test also includes a procedure for observing the sequencing of applicable master panel, slave panel, and zone sensor box meters, gauges, and lamps as zone pressure increases from normal atmospheric to a fully pressurized condition.

4-2.2 Static Air Probe and Condensate Drain Bowl Inspections.

The static air probe is routinely inspected for external damage and any debris or foreign objects blocking the area between the disks. Accumulated condensate water is also removed from the condensate drain bowl. These actions are conducted to ensure that the zone sensor box receives a true measure of external atmospheric pressure.



SS200-AH-MM-010

Figure 3-1. CPS Alarm System Component Functional Interaction

KEY

 Pneumatic Signal
 Electrical Signal

CHAPTER 5

TROUBLESHOOTING

5-1 INTRODUCTION.

This chapter provides troubleshooting procedures to help ship's crew identify malfunctions that might occur during operation and/or maintenance of the Collective Protection System (CPS) Alarm System. Since intermediate and depot level maintenance are not required for the alarm system, all troubleshooting procedures in this chapter are performed at the organizational level.

5-2 ORGANIZATIONAL LEVEL TROUBLESHOOTING PROCEDURES

Table 5-1 is a troubleshooting analysis chart for the Navy Shipboard CPS Alarm System. Use the chart to identify the problem and the probable cause of the problem, then perform the steps outlined under action.

Table 5-1 Trouble Analysis Chart

Symptoms	Probable Cause	Action	Reference
Master panel non-functional (lamps and meters do not work)	Missing ac/dc power	Quick ac/dc power test	6-3
	Missing ac/dc power	Test/restore ac/dc power	6-4
	Defective power supply assembly	Replace power supply assembly	6-5
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Master panel lamps operate but meter non-functional	Defective master panel meter	Test/replace master panel meter	6-8
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11

Symptoms	Probable Cause	Action	Reference
Master panel meter reading does not correspond to the zone pressure gauge	Flexible tubing in zone sensor box is damaged or kinked	Check tubing in sensor box for leaks or kinks	-
	Zone pressure gauge/master panel meter out of alignment	Align master panel meter	6-2
	Pressure gauge out of alignment or damaged	Test/repair zone sensor box	6-10
	Defective pressure transducer assembly in zone sensor box	Test/repair zone sensor box	6-10
	Defective wiring in zone sensor box	Test/repair zone sensor box	6-10
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defect in terminal box	Test/repair terminal box	6-12
	Defective ship's wiring	Test/repair ship's wiring	6-15
	Defective meter	Test/replace meter	6-8
	Defective circuit card	Test/replace circuit card	6-11
Slave panel does not operate although master panel is fully functional	Defective slave panel lamp test switch, lamp(s) wiring	Test/repair slave panel	6-13
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defect in terminal box	Test/repair terminal box	6-12
	Defective ship's wiring	Test/repair ship's wiring	6-15
	Defective circuit card	Test/replace circuit card	6-11

Symptoms	Probable Cause	Action	Reference
Master panel meter functional but one or more lamps do not operate	Defective lamp(s)	Test/replace lamps	6-9
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Slave panel lamp test switch does not light all lamps on slave panel	Defective lamp(s)	Test/replace lamps	6-9
	Defective lamp test switch or wiring	Test/replace lamp test switch/wiring	6-14
	Defect in terminal box	Test/repair terminal box	6-12
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective circuit card	Test/replace master panel circuit card	6-11
Differential pressure gauge at zone sensor box inaccurate	Broken or kinked tubing	Check tubing in sensor box for leaks or kinks	-
	Static air probe obstructed	Clear probe	4-2
	Pressure gauge out of alignment or damaged	Test/repair zone sensor box	6-10
Master panel meter reading does not correspond with indicator lamps	Zone pressure gauge/master panel meter out of alignment	Align master panel meter	6-2
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective master panel meter	Test/replace master panel meter	6-8
	Defective circuit card	Test/replace master panel circuit card	6-11

CHAPTER 6

CORRECTIVE MAINTENANCE

SECTION ADJUSTMENTS AND ALIGNMENTS

6-1 INTRODUCTION.

This chapter provides corrective maintenance procedures to be performed at the organizational level. Intermediate and depot level maintenance is not required for the Collective Protection System (CPS) Alarm System. Section I provides procedures for aligning the alarm system meters and gauges. Section II provides procedures for repairing faults discovered following the troubleshooting analysis chart in Chapter 5 of this manual. Schematic diagrams are also provided at the end of this chapter for use as necessary. All corrective maintenance can be performed with the zone either pressurized or unpressurized unless otherwise specified.

6-2 ALARM SYSTEM ALIGNMENT.

Master panel meters and zone sensor box gauges are aligned in accordance with the procedures described below. No other adjustments or alignments are required for the CPS Alarm System.

Alignment of the alarm system meters and gauges is performed by three personnel: one located at the master panel in Damage Control Central; one with a hand pressure pump, located at the zone sensor box in the CPS zone; and one at the slave panel in the pilot house. The pressure gauge on the zone sensor box is considered the primary measurement device. The person located at the master panel coordinates the actions of the personnel located at the zone sensor box and slave panel. Reliable communication must be established between personnel before beginning alignment. Repeat procedure until all total protection (TP) zones are aligned.

- a. Components: master panel/zone sensor box/slave panel.
- b. Frequency: as required.
- c. Related maintenance: none.
- d. Maintenance task description: alarm system alignment.
- e. Safety precautions: potential for electrical shock.
- f. Tools, parts, materials, test equipment: straight blade screwdriver (3/16" to 1/4"

wide), jeweler's screwdriver, hand pressure pump (figure 6-9), tubing clamp or equivalent.

g. Procedure:

- (1) Position three personnel as indicated above.
- (2) At master panel ensure that the master panel circuit breaker CB1 (figure 6-1) is pushed in (on). Press and hold the lamp test switch on the master panel (figure 6.1). All lamps on the master panel should illuminate. If they do not, refer to troubleshooting (chapter 5). Release the lamp test switch after verifying the operation of the lamps.
- (3) Open front and inner panels of the master panel.
- (4) Open front panel of the zone sensor box. Disconnect the flexible tubing from the pressure gauge and the pressure transducer assembly noting its original configuration (figure 6-2). Observe the pressure reading of pressure gauge. If the pressure gauge does not indicate 0.0 in. wg pressure, adjust to read 0.0 by turning the adjustment screw on the face plate (figure 6-3). Adjust the screw slowly in either a clockwise or counter-clockwise direction. Leave the flexible tubing disconnected.
- (5) At the master panel, verify that all circuit card switches are in the NORM position (figures 6-4 and 6-5). Verify that the person at the zone sensor box has performed step (4).
- (6) At master panel, observe the master zone meter of the zone undergoing alignment. The desired zero pressure range is a meter reading equal to or greater than 0.0 but less than 0.1 inches pressure. If the zone meter does not indicate 0.0 pressure, adjust the meter to it's lowest reading (but no lower than 0.0) by turning the adjustment screw on it's face plate slowly either clockwise or counter-clockwise. If the meter cannot be mechanically adjusted to less than 0.1 inch pressure, adjust potentiometer

Symptoms	Probable Cause	Action	Reference
Master panel lamp test switch does not light all lamps on master panel	Defective lamp(s)	Test/replace lamps	6-9
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective lamp test switch	Test/replace lamp test switch	6-14
	Defective circuit card	Test/replace circuit card	6-11
Master panel lamp test switch does not cause lamps on slave panel to light	Defective lamp(s)	Test/replace lamps	6-9
	Defective RFI filter	Test/replace RFI filter	6-7
	Defective master panel wiring	Test/repair master panel wiring	6-6
	Defective lamp test switch	Test/replace lamp test switch	6-14
	Defect in terminal box	Test/repair terminal box	6-12
	Defective ship's wiring	Test/repair ship's wiring	6-15
	Defective circuit card	Test/replace circuit card	6-11

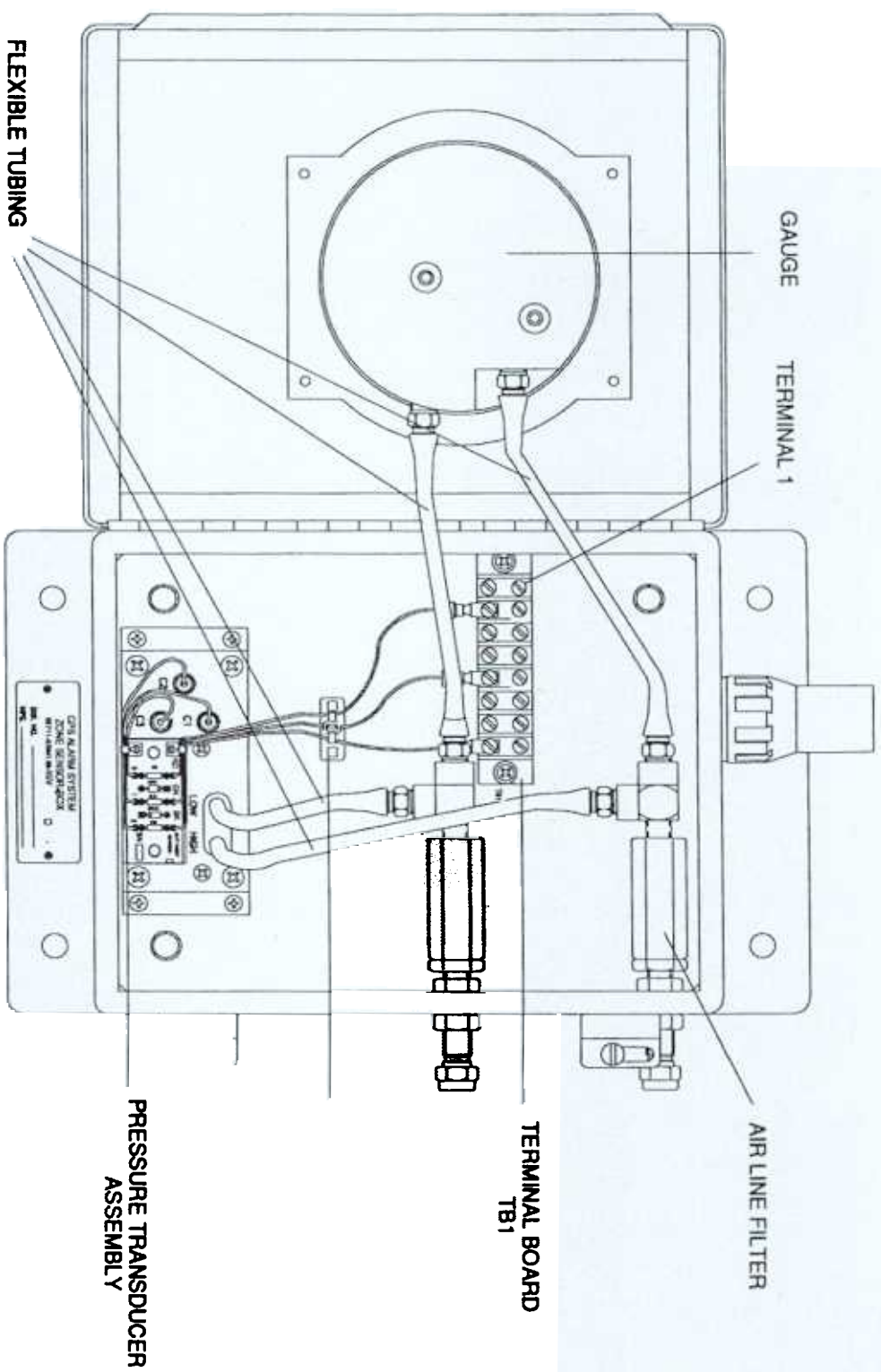


Figure 6-2. Zone Sensor Box, Door Open

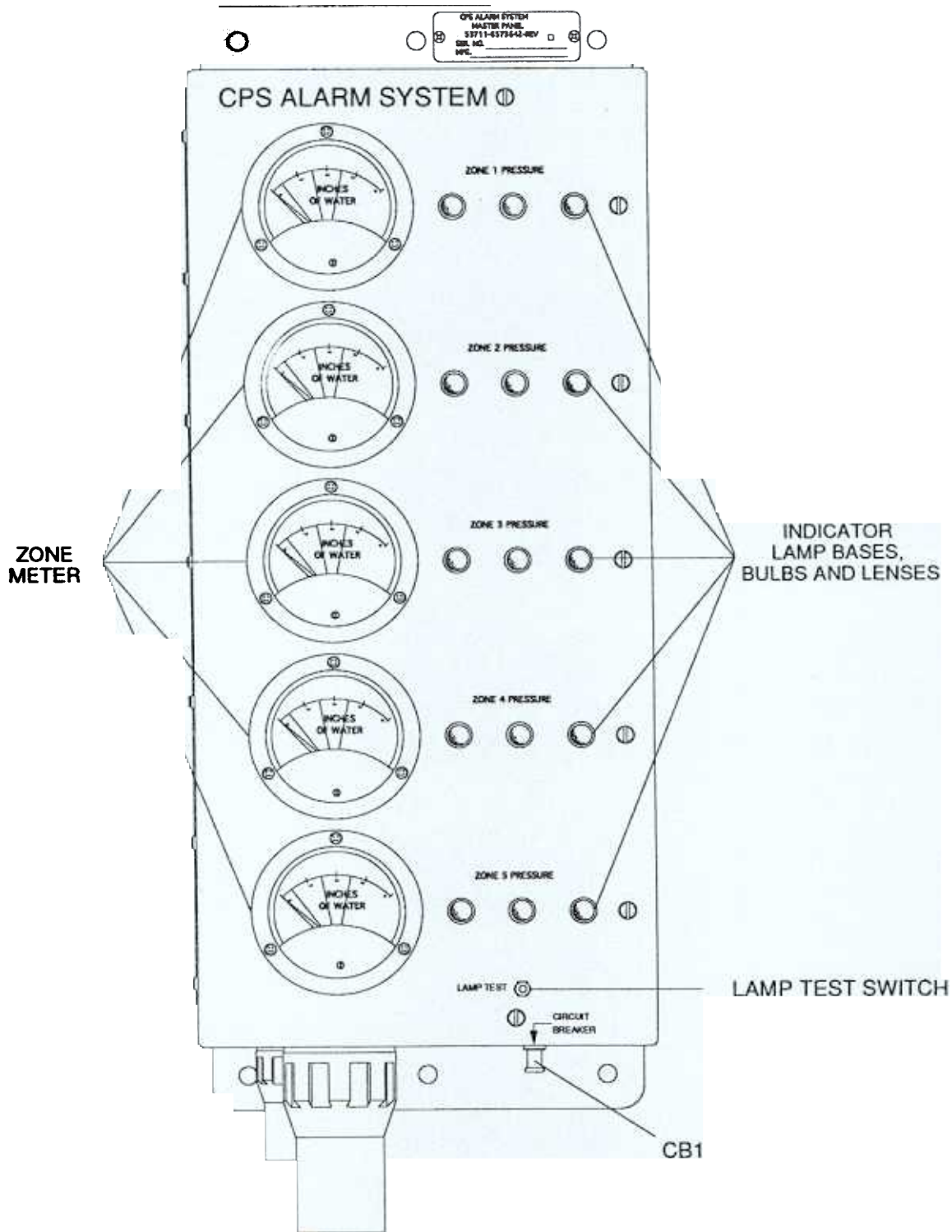


Figure 6-1. Master Panel

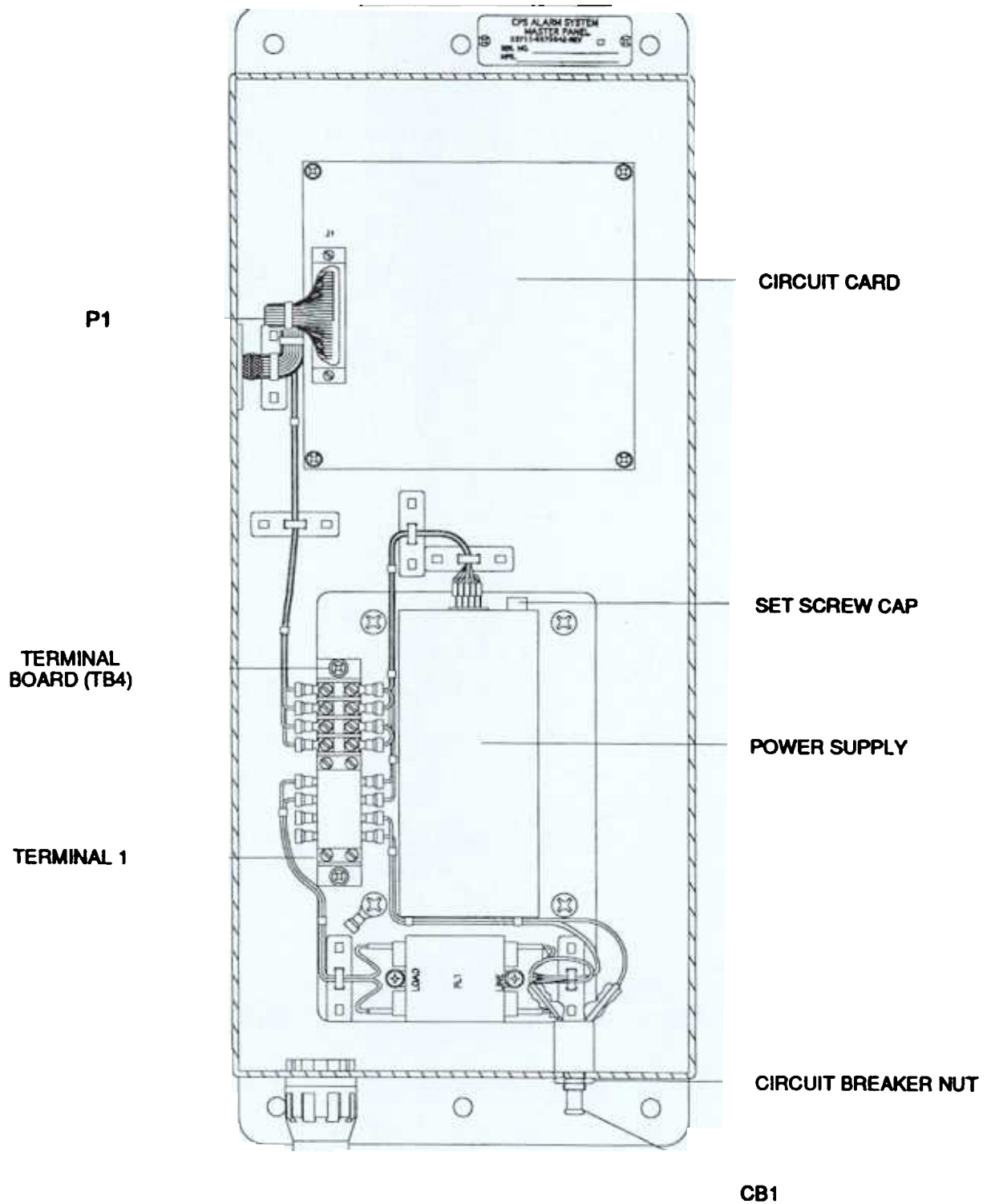


Figure 6-4. Master Panel, Inner Door Removed

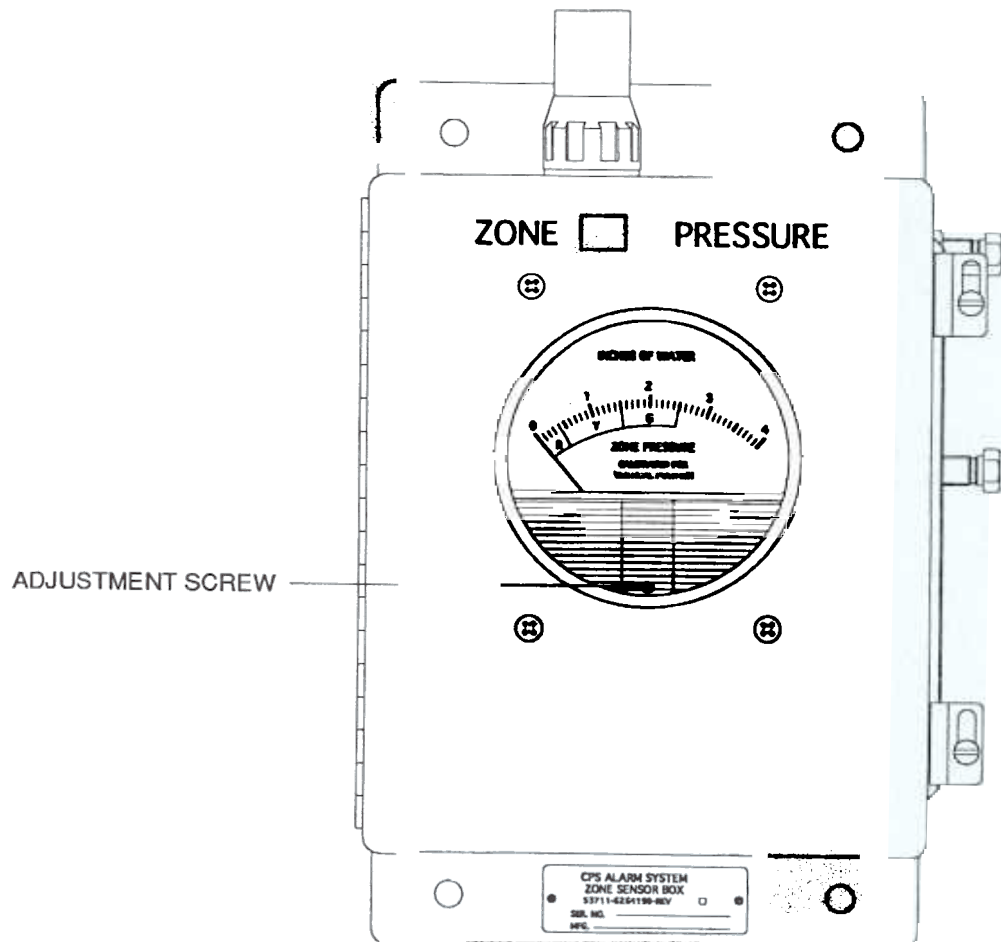


Figure 6-3. Zone Sensor Box

R17 of the proper zone (potentiometers are labeled R17A to R17E (figure 6-5) on the circuit card for zone 1 to 5 respectively) counter-clockwise until the zone meter reads within the desired zero pressure range.

- (7) At the zone sensor box, connect one end of the flexible tubing from the hand pressure pump to the HIGH port of the pressure transducer assembly. Connect the other end to the HIGH port of the pressure gauge. The connections must be leak-tight. Close, but do not over-tighten, the valve on the hand pump by turning the knurled knob clockwise.

CAUTION

Exercise care when using the hand pressure pump. Apply pressure by very gently squeezing the bulb. A sudden pressure pulse may damage the pressure gauge, the pressure transducer assembly, and the master panel zone meter.

- (8) When the person at the master panel is ready, the person at the zone sensor box is instructed to apply pressure with the hand pressure pump to cause the pressure gauge to read 2.0 in. wg pressure (pressure may be lowered by slightly opening the hand pump valve). It may be necessary to clamp the flexible tubing at the pump to prevent slow leakage through the bulb. The person at the master panel should be notified once 2.0 in. wg is maintained on the pressure gauge. The master panel zone meter should read 2.0 ± 0.1 in. wg. If not, adjust R17 in small increments clockwise to increase the meter reading and counterclockwise to decrease the meter reading until a matching pressure measurement is obtained on the master panel zone meter. The person at the zone sensor should monitor the pressure gauge reading closely. If the pressure reading drifts away from 2.0 in. wg, the person at the master panel should be notified and the pressure reading corrected. (Pinching the pump's flexible tubing between a thumb and forefinger will often correct small pressure drops.) This step must be

completed and verified before proceeding.

NOTE

Inability to maintain pressure when tubing is clamped indicates a problem with the gauge, tubing, or fittings.

- (9) Once matching 2.0 in. wg readings are obtained at the zone sensor box and the master panel zone meter, while maintaining coordination between the person at the master panel and the person at the zone sensor box, the pressure reading on the zone pressure gauge is reduced in 0.5 in. wg steps. At each step, the pressure on the zone sensor gauge is stabilized. Within 5 seconds the master panel zone meter should match the reading on the zone sensor box gauge within a ± 0.1 in. wg tolerance.

CAUTION

Exercise care when using the hand pressure pump. A sudden pressure pulse may damage the pneumatic gauge, pressure transducer, and/or the zone meter.

- (10) It may be necessary to make small adjustments to the master panel zone meter zero adjustment screw and the zone gain adjuster, R17, in order to obtain readings throughout the calibration range that are within the ± 0.1 in. wg tolerance.
- (11) Check for repeatability by alternately applying and releasing pressure to the zone sensor box gauge and comparing readings.

Notes for indicator lamp adjustments:

- (i) Due to the allowable tolerances in the system, the gauge and meter readings may be slightly different. Pressure is adjusted to the zone meter reading. Pressure settings must be stabilized and held constant during each phase of the alignment procedures. If the pressure starts to drift during a procedure, it must be

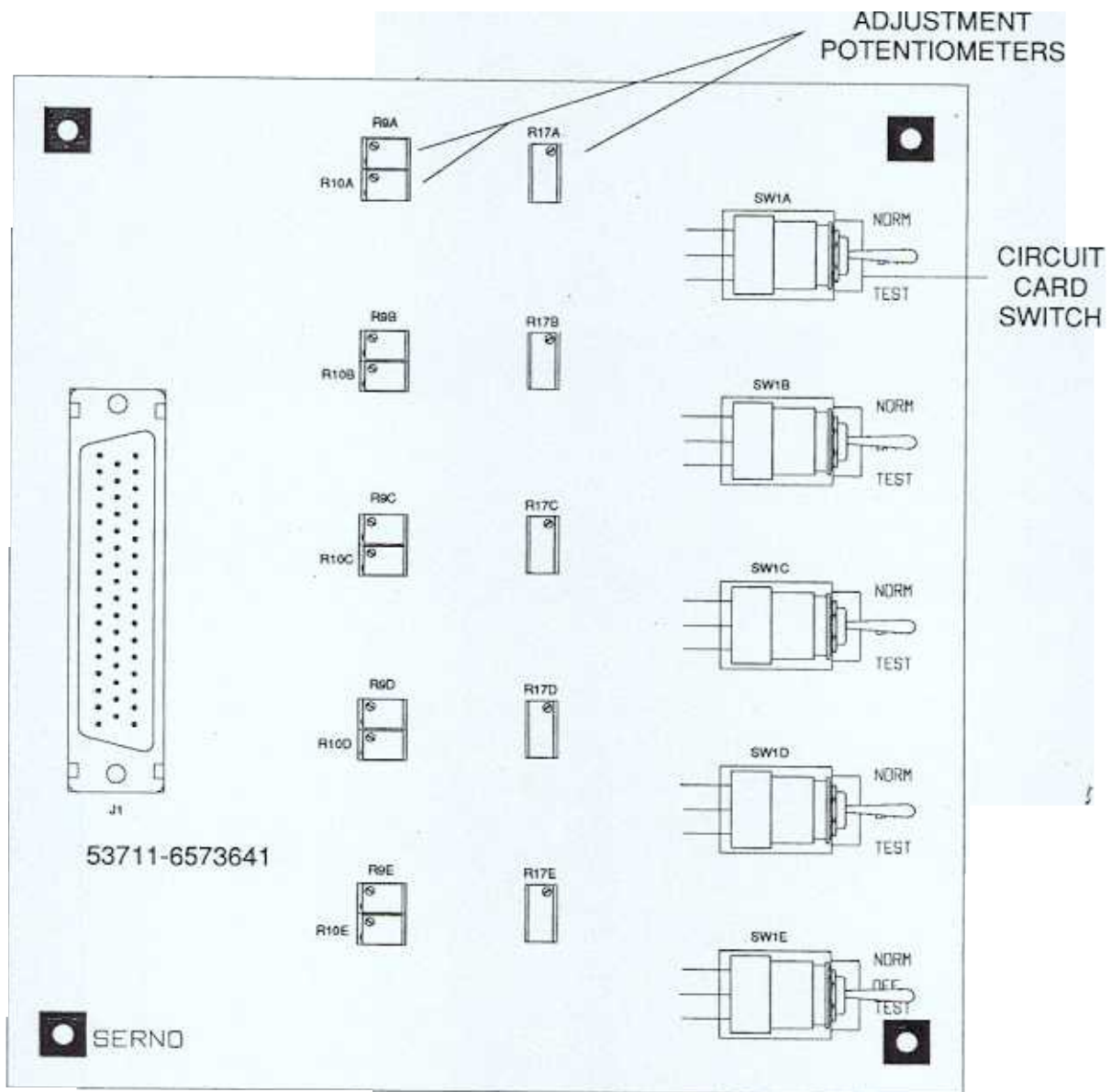


Figure 6-5. Circuit Card

- (22) With the CPS zone unpressurized, all lamps on the slave panel should be illuminated (figure 6-6). Confirm lamp operation as required by pushing in the slave box lamp test switch.
- (23) To check the operation of the slave panel indicator lamp of the zone under test, ensure that the person at the zone sensor box has released the hand pump valve and the gauge needle is in the red zone (under 0.4 in. wg).
- (24) The indicator lamp for the zone under test should be illuminated.
- (25) Have the person at the zone sensor box apply pressure to the gauge with the hand pressure pump slightly until the gauge moves out to the red zone into the yellow or green zone (greater than 0.4 in. wg). Stabilize and maintain the pressure.
- (26) The slave panel indicator lamp should turn off.
- (27) Press the slave panel test switch. All of the slave indicators should illuminate including the indicator for the zone under going test/alignment.
- (28) Release the slave lamp test switch.
- (29) Have the pressure on the zone sensor gauge released slowly. The person at the sensor box should inform the person at the slave panel as the pressure reading approaches the red zone (0.4 in. wg) and as the pressure falls into the red zone on the gauge. The slave lamp for the zone under test should illuminate as the pressure falls below 0.4 in. wg.
- (30) If the slave panel does not function properly, refer to troubleshooting in Chapter 5.
- (31) Disconnect the hand pressure pump from the pressure gauge and the pressure transducer assembly. Reconnect the low pressure flexible tubing to the ports marked LOW on the gauge and the pressure transducer assembly. Reconnect the high pressure flexible tubing to the ports marked HIGH on the gauge and pressure transducer assembly. Check the flexible tubing connections for a tight fit on the fittings and that there are no tears in the tubing. Close and secure the zone sensor box panel, check the flexible tubing as the panel is closed to ensure that there are no kinks in the lines.
- (32) Repeat all alignment procedures for all TP zones.
- (33) Close and secure inner and outer panels of the master panel.

- reset before further adjustments are made. This procedure involves adjustment of potentiometers R9 and R10 (figure 6-5). The potentiometers are labeled R9A to R9E on the circuit card for zone 1 to 5 respectively.
- (ii) The small pressure adjustments are most readily obtained by locking the hand pump at the "just below" pressure. The person at the zone sensor box can then pinch the flexible tubing between a thumb and forefinger to slightly increase the pressure. The pressure can be dropped slightly by releasing the pinched tube. It may be necessary to periodically reset the low pressure point due to leakage.
 - (iii) Green/Yellow Transition Adjustment: Set the green lamp trip point so that a yellow to green lamp transition occurs as the zone meter needle moves from the "yellow zone" into the "green zone" and a green to yellow lamp transition occurs as the needle moves from the "green zone" into the "yellow zone" (see below).
 - (iv) Red/Yellow Transition Adjustment: Set the red lamp trip point so that a yellow to red lamp transition occurs as the zone meter needle moves from the "yellow zone" into the "red zone" and a red to yellow lamp transition occurs as the needle moves from the "red zone" into the "yellow zone" (see below).
- (12) The person at the master panel should have the person at the zone sensor box apply pressure to zone sensor gauge until the master panel zone meter needle is just barely above the 1.5 in. wg mark.
 - (13) If the green lamp of the zone undergoing alignment is not illuminated, turn potentiometer R9 of the proper zone counter-clockwise until the green lamp just illuminates. If the green lamp was illuminated at the start of the step, turn R9 clockwise until it turns off, then turn R9 counter-clockwise until it just illuminates.
 - (14) Let the pressure drop until the zone meter needle is just below 1.5 in. wg but greater than 1.4 in. wg. The green lamp should turn off and the yellow lamp should illuminate as the needle of the meter moves from the green area into the yellow area.
 - (15) If the green lamp does not turn off, turn R9 slightly clockwise until the yellow lamp just illuminates and the green lamp turns off. Bring the pressure back up to just over 1.5 in. wg and repeat steps 12 through 15 until proper transition occurs.
 - (16) The person at the master panel should have the person at the zone sensor box apply pressure to zone sensor gauge until the master panel zone meter needle is just barely below the 0.4 in. wg mark.
 - (17) If the red lamp of the zone undergoing alignment is not illuminated, turn potentiometer R10 of the proper zone counter-clockwise until the red lamp just illuminates. If the red lamp was illuminated at the start of this step, turn R10 clockwise until it turns off, then turn R10 counter-clockwise until it just illuminates.
 - (18) Raise the pressure until the zone meter needle is just above 0.4 in. wg but less than 0.5 in. wg. The red lamp should turn off and the yellow lamp should illuminate as the needle of the meter moves from the red area into the yellow area.
 - (19) If the red lamp does not turn off, turn R10 slightly clockwise until the yellow lamp just illuminates and the red lamp turns off. Lower the pressure back to just under 0.4 in. wg and repeat steps 16 through 19 until transition occurs.
 - (20) After setting the red/yellow lamp transition points, recheck the operation of the green/yellow transition by bringing the pressure back up to 1.6 in. wg. A slight readjustment may be required after setting the red/yellow trip point. If the green/yellow transition does not still operate as they were previously set, repeat steps 12 through 15 only.
 - (21) At the master panel, check for proper operation of the master panel. Have the person at the zone sensor box gradually apply and release pressure throughout the operating range of 0.0 to 2.5 in. wg while calling out the pressure readings. Verify that the zone meter tracks the pressure changes and the zone indicator lamps indicate the corresponding pressure ranges.

Section II. REPAIR

6-3 QUICK AC/DC POWER TEST.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- a. Ensure ship's breaker is on and that 110 Vac power is being provided from ship's breaker panel.
- b. Ensure master panel is on by pushing in circuit breaker CB1 (figure 6-1).
- c. Open front panel of master panel (figure 6-7).
- d. Locate terminal board TB1 on front of inner panel.
- e. Place negative lead of volt-ohm meter (VOM) on either post of terminal (3).
- f. Place positive lead of the VOM on either post of terminal (4).
- g. A reading of 12 ± 0.2 Vdc measured across these of terminals indicates there is no ac/dc power supply fault.

6-4 TEST/RESTORE AC/DC POWER.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- a. If a reading of 12 Vdc was not obtained in the Quick AC/DC Power Test (section 6-3), ensure ac power is available from ship's breaker panel. If breaker is off or tripped, an indication of a problem, then proceed with step b. If breaker is on, in normal condition, proceed with step c below.
- b. Reset and turn on ship's breaker. If breaker trips off, there is a short circuit condition.
- c. Turn ship's breaker off.
- d. Ensure master panel circuit breaker CB1 is off by pulling out the circuit breaker.

- e. Open front and inner panels of master panel (figure 6-4).
- f. Locate the terminal board TB4 on power supply assembly and remove plastic shield fastened at terminals (1) and (6).
- g. Remove yellow and gray wires from terminals (2) and (3). Isolate wires so they do not make contact with terminal board.
- h. Turn ship's breaker on. If ship's breaker stays on go to step (i), otherwise there is a short in the ship's wiring. Repair ship's wiring accordingly.

WARNING

Ac power is supplied to the master panel when the ship's breaker is on. Be careful not to make contact with the circuit card or terminals two (2), three (3), four (4), or five (5) on terminal board TB4.

Test for 110 Vac power across terminals (2) and (3) using VOM. If 110 Vac does not exist at these terminals there is a fault in ship's wiring that supplies the master panel. Repair ship's wiring accordingly. If power is supplied, turn off ship's breaker, reconnect the yellow and gray wires to terminals (2) and (3) respectively, and replace plastic shield.

- j. Turn on ship's breaker. If breaker trips off replace power supply assembly (see section 6-5), otherwise proceed with step k.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- k. Push in circuit breaker CB1 on master panel. If breaker trips off continue with step l. If breaker stays on, go to step n.
- l. Remove red striped wires from terminals (7) and (8) of terminal board TB4. Isolate wires so they do not make contact with terminal board.

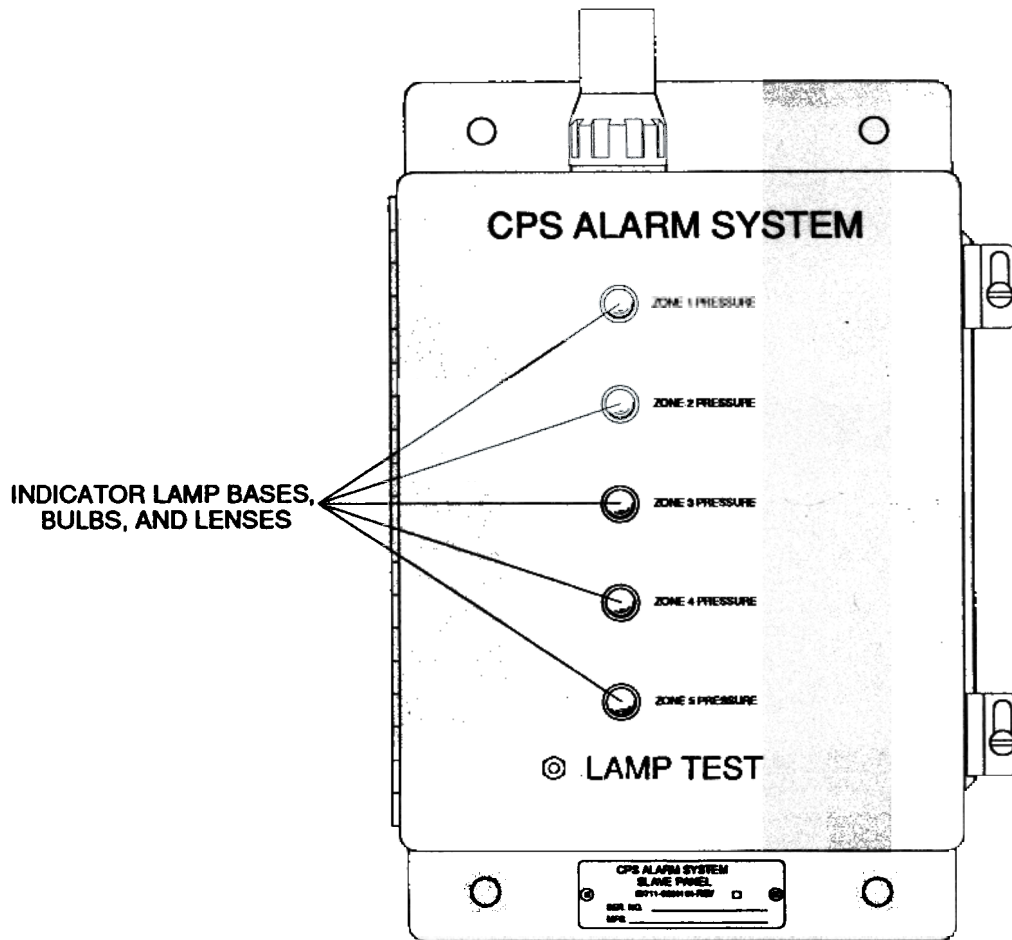


Figure 6-6. Slave Panel

- m. Push in circuit breaker CB1 on master panel. If breaker trips off replace power supply assembly. If breaker stays on, a problem exists within the wiring of master panel.
- n. Remove the red/white, red/yellow, and red/green wires from TB4-7 and TB4-8.
- o. Measure the dc voltage across TB4 terminals by attaching the positive probe to terminal (8) and the negative probe to terminal (10). If 12 ± 0.2 Vdc is not present replace power supply. If 12 Vdc is present continue below with short isolation procedures.
 - (1) Reconnect red/white wire to terminal TB4-8 and repeat dc voltage measurements in (e) above. If no voltage is present, there is a short in the wiring harness from TB4-8 to TB1-4. Proceed with 6-6, 6-7, 6-12, or 6-13. If voltage is present, proceed as below.
 - (2) Reconnect red/yellow wire to terminal on TB4-7. Repeat voltage measurement described in (e) above. If no voltage is present, a short exists in the circuit card or wire to circuit card. Follow procedures in 6-6 or 6-11. If voltage is present, proceed as below.
 - (3) Reconnect red/green wire to terminal TB4-8 and repeat dc voltage measurements in (e) above. If no voltage is present, a short exists in the wire path from TB4-8 to the center post of all lamp bases in master panel front cover. Proceed with 6-6 or 6-7.
- p. If none of the wires indicated problems, reconnect all striped wires on terminals. Measure dc voltage across terminals (7) and (10) of TB4. If voltage is not present, replace power supply assembly described below.

6-5 REPLACE POWER SUPPLY ASSEMBLY.

NOTE

Perform ac/dc power test per 6-4 before proceeding with this section.

- a. Locate and turn off ship's breaker that supplies ac power to master panel. Pull out circuit breaker CB1 on the master panel, turning alarm system off.
- b. Open front and inner panels of master panel.
- c. Locate power supply assembly mounted to back plate (figure 6-4).
- d. Remove plastic shield attached to terminals (1) and (6) of terminal board TB4.
- e. Remove and label positions of all wires from the left side of terminal board TB4. Isolate all disconnected ends.
- f. Hold circuit breaker CB1 inside master panel so it does not rotate. Unscrew circuit breaker nut outside master panel. Remove circuit breaker from mounting hole.
- g. Remove power supply assembly by unscrewing four cross-tip screws.
- h. Mount new power supply assembly using four cross-recessed screws.
- i. Mount circuit breaker CB1 by holding it to prevent rotation while tightening nut.
- j. Remove plastic shield from terminals (1) and (6) of terminal board TB4.
- k. Reconnect wires removed from terminals (2) and (3).
- l. Replace plastic shield to terminals (1) and (6) of TB4.
- m. Unscrew and retain black cap from top of power supply to expose set screw.
- n. Trial fit jeweler's screwdriver into set screw being careful not to make contact with circuit card or terminal board TB4.
- o. Attach the positive voltmeter probe to terminal (8) and the negative probe to terminal (10) of TB4.
- p. Turn on ship's breaker supplying ac power to master panel.

WARNING

Ac power is supplied to the master panel when the ship's breaker is on. Be careful not to make contact with the circuit card or terminals two (2), three (3), four (4), or five (5) on terminal board TB4.

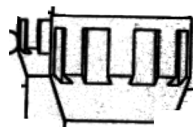
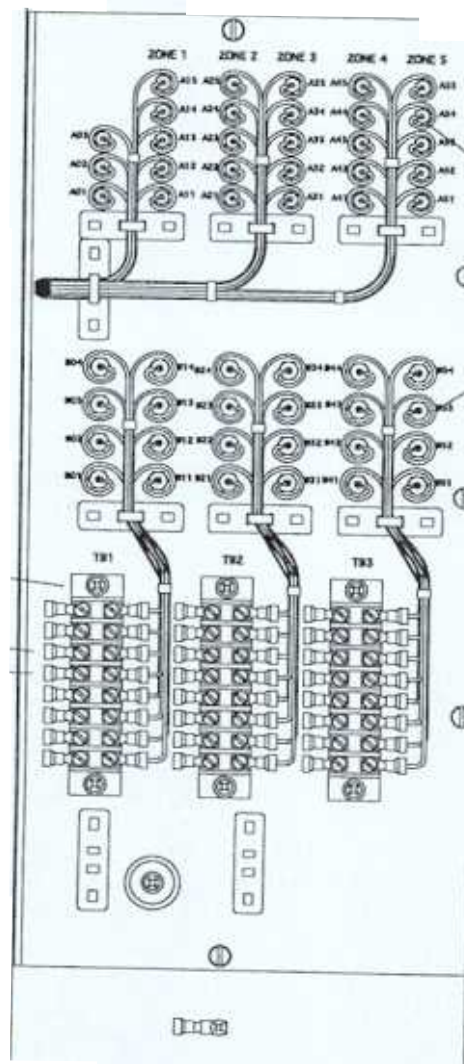
- q. Push in circuit breaker CB1 on master panel turning the alarm system on.
- r. Turn on voltmeter and obtain a reading. Adjust power supply output voltage to 12 Vdc by turning set screw as necessary. (Adjustments should be made in small increments.)
- s. Pull out circuit breaker CB1 on master panel turning alarm system off.
- t. Turn off ship's breaker supplying ac power.
- u. Remove voltmeter and replace black cap on power supply.
- v. Reconnect striped wires to terminals (7), (8), (9), and (10) of terminal board TB4.
- w. Close inner panel of master panel.
- x. Perform Quick AC/DC Power Test per 6-3.

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6-9 TEST/REPLACE LAMP BASES, BULBS, AND LENSES.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- a. Master or slave panel lens:
 - (1) Remove each lens one at a time by unscrewing it from the base (figures 6-1 and 6-6).
 - (2) Pull out bulb from lens.
 - (3) Inspect lens for damage. Replace any damaged, corroded, or discolored lens with a same color lens.
- b. Master or slave panel bulbs:
 - (1) Ensure master panel is on by pushing in CB1.
 - (2) Press master and slave panel lamp test switch. Replace bulbs that do not glow. (Resistance across removed bulb should be 20 ± 5 ohms. If bulb has no continuity or high resistance, it should be replaced.)
 - (3) Retest using lamp test switch.
 - (4) If lamp(s) still do not operate, proceed with (c) below or see Trouble Analysis Chart, Table 5-1, Lamp test nonfunctional.
- c. Master or slave panel lamp bases:
 - (1) Place master panel circuit breaker in off position.
 - (2) Open front door of panel being serviced.
 - (3) Visually inspect all lamp bases for damage. Replace any base that is cracked or broken or that has broken, loose, or burnt terminals.
 - (4) Remove lens from base and replace any base found to be corroded, have burned or blackened bulb contact points, or stripped or damaged lens threads.
 - (5) Open inner door of master panel. Loosen captive connector screws and unplug P1 from circuit card (figure 6-4).
 - (6) With a good bulb in base, resistance across base terminals should be 5 to 7

ohms. With a bad bulb or no bulb, this continuity check should show an open circuit.

- (7) An open circuit indication should be observed between the center terminal and front panel plate or any ground point. Replace base if continuity is found. (An open circuit should also be found between the outer terminal and front panel plate or ground point.)
- (8) Plug P1 back into circuit card and tighten captive connector screws.
- (9) To check slave panel, open front panel and disconnect red/white wire on terminal board, terminal (3). Conduct tests (5) through (6) above (figure 6-8).

6-10 TEST/REPAIR ZONE SENSOR BOX.

- a. Differential pressure gauge:
 - (1) Ensure master panel circuit breaker CB1 is in the off position. Open zone sensor box (figure 6-2).
 - (2) Ensure tubing, low inlet port, and zone pressure inlet port are unobstructed and not damaged.
 - (3) Inspect gauge for damage.
 - (4) Disconnect flexible tubing from gauge and pressure transducer and inspect tubing for any leakage, damage, or obstructions.
 - (5) Turn zero adjust screw on face of gauge to obtain a zero reading.
 - (6) Attach hand pressure pump (figure 6-9) to high pressure inlet of gauge and pressure transducer and slowly apply pressure. Gauge needle should move smoothly with pressure variations.
 - (7) Close valve on hand pump and clamp tubing. While gauge is pressurized, pressure should not drop more than 0.2 in. wg per minute.
 - (8) Replace differential pressure gauge if it does not hold pressure, will not zero adjust, the needle does not move smoothly, or it is damaged.
 - (9) Inspect all tubing and fittings for leakage. Inspect tubing for cracks, cuts, splitting, or other damage. Replace tubing or fittings as necessary.

6-6 TEST/REPAIR MASTER PANEL WIRING.

WARNING

Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- a. Ensure the master panel is on by pushing in circuit breaker CB1 (figure 6-1).
- b. Open front and inner panels of master panel. (figure 6-4)
- c. Conduct visual inspection for wiring damage and loose or broken connections including solder connections. Observe lamps and meters during inspection. (Intermittent operation of lamps or meters could indicate location of a wiring defect.) Repair or replace damaged wires, terminal lugs, and connections.
- d. Place master panel circuit breaker CB1 in off position.
- e. Loosen captive connector screws and unplug circuit card connector P1 (figure 6-4).
- f. Check all wire terminations at P1 and replace any faulty crimp socket terminations. Remove old socket and reinsert new socket/wire termination.
- g. Locate TB4 on the power supply assembly and remove red/white, red/yellow, and red/green wires from terminal posts 7 and 8.
- h. Remove black/white, black/yellow, and black/green wires from posts 9 and 10 of TB4. Isolate all disconnected ends. Check continuity and resistance of red/yellow wire terminal end to socket #37 of circuit card connector P1. Resistance should be < 1 ohm. Repair or replace wire, crimp terminal/socket if not continuous or if high resistance is found.
- j. Check continuity and resistance of black/yellow wire terminal end to socket #36 of circuit card connector P1. Resistance should be < 1 ohm. Repair or replace wire, crimp terminal/socket if not continuous or if high resistance is found.
- k. Test all remaining wires from TB4 and P1 for continuity and resistance to filters on inner panel. All paths should be continuous

and < 2 ohms. Repair or replace faulty wires, crimp terminals, or solder points as required.

- l. Test all wires from filters on inner panel to their respective terminations points at TB1, TB2, and TB3 (figure 6-4); master panel meters; indicator lamps; and test switch for continuity and resistance. All paths should be continuous and < 2 ohms. Repair or replace faulty wires, crimp terminals, or solder points as required.
- m. Plug in circuit card connector P1 and tighten captive connector screws.

6-7 TEST/REPLACE RFI FILTERS.

- a. Ensure master panel circuit breaker CB1 is in off position (figure 6-1).
- b. Open face panel of master panel (figure 6-4).
- c. Open inner panel. Unplug P1 from circuit card (figure 6-4).
- d. Test for shorts in all filters on inner panel by conducting a resistance check from either terminal end of filter to filter case (figure 6-7). The test should indicate an open circuit or a resistance > 1 megohm. Replace faulty filters.
- e. Test all filters on inner panel for continuity by measuring resistance between terminal posts of each filter. The path should be continuous and measure < 1 ohm. Replace any faulty filters.

6-8 TEST/REPLACE MASTER PANEL METER.

- a. Place master panel circuit breaker CB1 in the off position (figure 6-1).
- b. Replace meter if indicator needle sticks in a random or fixed position and/or does not zero adjust.
- c. Open face and inner doors of master panel (figure 6-4).
- d. Remove wire from positive (+) terminal of suspect meter.
- e. Conduct a continuity and resistance check across meter terminals. Normal reading is within $\pm 10\%$ of the resistance marked on the back of meter. An open condition, high resistance, or shorted condition indicates meter is bad and should be replaced.
- f. Place master panel circuit breaker CB1 in the on position.
- g. Close and secure doors.

b. Pressure transducer assembly:

WARNING

Power is supplied to the zone sensor box during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

- (1) Place master panel circuit breaker CB1 in the on position (figure 6-1).
- (2) Ensure proper operation of differential pressure gauge by conducting test in (a) above.
- (3) Locate terminal board. Inspect wires, terminal lugs, solder connections and terminals for damage (figure 6-2).
- (4) Connect VOM with positive lead on red wire and negative lead on black wire both at terminal board. If normal voltage of 8 ± 2 Vdc is obtained proceed with (6) below.
- (5) Remove red wire leading to the pressure transducer assembly from terminal board and repeat measurement taken in (4) above. If voltage is present, replace pressure transducer assembly. If voltage is not present, reconnect red wire and continue troubleshooting for faults in ship's wiring, terminal box, or master panel.
- (6) Connect VOM with the positive lead on the green wire and negative lead on black wire both at the terminal board.
- (7) Attach hand pressure pump to high pressure ports of differential pressure gauge and pressure transducer assembly. Slowly vary pressure applied to gauge. VOM should show an increasing voltage (less than the voltage obtained in (4) above) as pressure is increased and decreasing voltage as pressure is decreased.
- (8) If voltage reading does not change with pressure variance, disconnect green wire from terminal board, reconnect VOM to green wire terminal lug, and repeat (7) above. Replace pressure transducer assembly if voltage readings do not vary. If voltage does vary, there is a problem in ship's wiring, terminal box, or master panel.

c. Replacing pressure transducer assembly:

- (1) Pull out circuit breaker CB1 on the master panel turning the system off.

- (2) Open front panel of zone sensor box (figure 6-2).
- (3) Locate pressure transducer assembly mounted on back plate.
- (4) Cut tie straps to free wiring between terminal board and transducer assembly.
- (5) Remove pressure transducer assembly wires (3) from terminal board and label terminal positions for reinstallation.
- (6) Unscrew four cross-recessed screws from the corners of the pressure transducer assembly and remove assembly.
- (7) Mount new pressure transducer assembly using four cross-recessed screws.
- (8) Attach pressure transducer assembly wires (3) to the terminal board maintaining previous color pattern.
- (9) Secure wiring to back plate using tie-straps.
- (10) Perform alarm system alignment per 6-2.

6-11 TEST/REPLACE MASTER PANEL CIRCUIT CARD.

WARNING

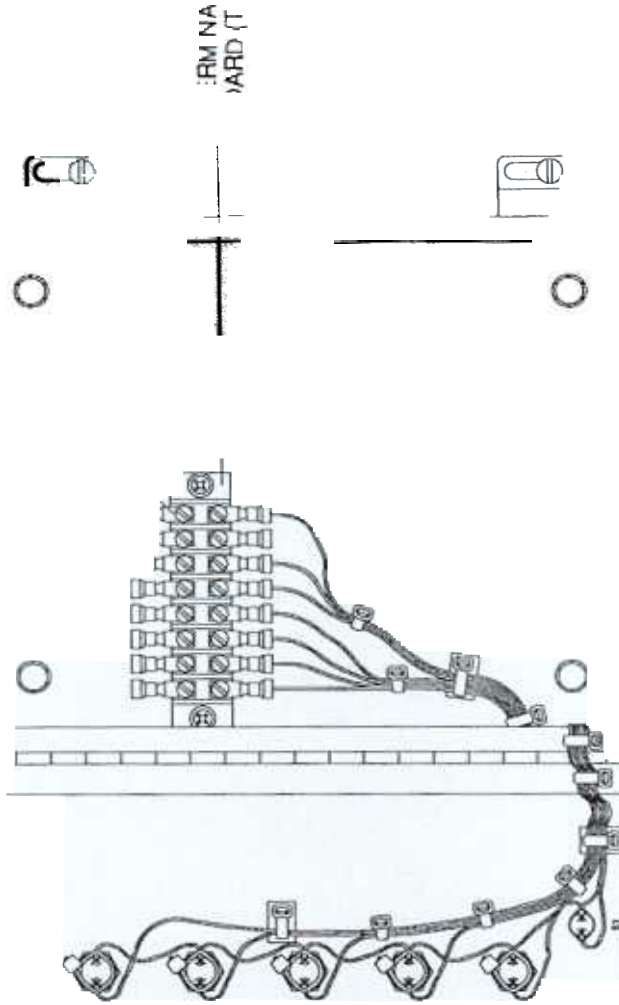
Power is supplied to the master panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

a. Test functions of circuit card:

- (1) All ac and dc power tests should have been successfully accomplished.
- (2) Place master panel in the on position by pushing in the circuit breaker CB1 (figure 6-1). Zone pressure is at normal atmospheric pressure (zone down).
- (3) Place all circuit card zone switches in their TEST position (figure 6-5). All zone meters on the front of the master panel should move into the green zone. All green indicator lamps should illuminate. All red and yellow lamps should be off.
- (4) Place all circuit card zone switches in their OFF position (figure 6-5). All zone meters on the front of the master panel should be at their zero pressure position. All master panel and slave panel indicator lamps should be off.

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- b. Open face and inner doors of master panel.
- c. Loosen captive connector screws and unplug P1 from circuit card (figure 6-4).
- d. The following tests apply to both master and slave panel lamp test switches.
 - (1) Visually inspect switch for broken or cracked button or case. Check button for smooth operation with no sticking. Check for broken, cracked, or burnt terminals. Replace if necessary.
 - (2) With lamp test switch in the normal OUT position, check continuity across the switch terminal. Replace switch if any resistance or continuity is observed.
 - (3) Push and hold test switch in ON position and check resistance across terminals. Resistance should be < 1 ohm. If high resistance or an open circuit condition is found, replace switch.
- e. Plug P1 back into circuit card and tighten captive connector screws.
- f. Close and secure panel doors.

6-15 TEST/REPAIR SHIP'S WIRING.

- a. Ship's wiring will vary according to each installation, particularly with the number of zones being monitored. The overall alarm system wiring diagram, figure 6-10, shows signal paths for a five zone system.
- b. When troubleshooting ship's wiring:
 - (1) Perform continuity test using an ohmmeter to identify open or shorted wiring.
 - (2) With wires removed from terminal boards, resistance readings should be less than 10 ohms for continuity and greater than 100K ohms for short circuit testing.
 - (3) All lines should be tested for shorts to the ship's structures as well as wire-to-wire.

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- (5) Return all circuit card switches to their NORM positions.
- (6) Perform alarm system alignment per 6-2 to ensure proper operation of the circuit card.
- b. Replacing master panel circuit card:
 - (1) Locate and turn off ship's breaker that supplies ac power to master panel.
 - (2) Pull out the circuit breaker CB1 on master panel turning system off.
 - (3) Open front and inner panels of master panel and locate circuit card mounted to back plate (figure 6-4).
 - (4) Loosen captive connector screws and unplug connector P1 from the circuit card.
 - (5) Check all wire terminations at connector P1 and repair any faulty crimp socket terminations.
 - (6) Remove circuit card by unscrewing four cross-recessed corner screws.
 - (7) Tighten standoffs if loose, taking care not to over-torque.
 - (8) Mount replacement circuit card using four cross-tip screws.
 - (9) Plug connector P1 into card J1 ensuring proper orientation, alignment, and fit.
 - (10) Tighten captive connector screws and perform alarm system alignment per 6-2.
- a. Ensure master panel is operating properly and procedures of 6-4, Test/Restore Dc Power, have been completed.
- b. Place master panel circuit breaker CB1 in the on position.
- c. Press slave panel lamp test switch. All zone indicator lamps should light. (Lamps will already be lit if zone is not pressurized.) If lamps do not operate correctly, open slave panel (figure 6-8).
- d. Locate terminal board. Using a VOM measure voltage by attaching positive probe to terminal post (3) and the negative probe to terminal post (2). This voltage should be 12 ± 0.2 Vdc. If not:
 - (1) Remove red/white wire from terminal (3) and repeat measurement.
 - (2) If voltage is present proceed to (e) below.
 - (3) If voltage is still absent, conduct procedures outlined per 6-3, 6-12 and 6-15.
- e. Remove and isolate red/white wire (+12 Vdc) from terminal (3) which performs the same function as placing the master panel circuit breaker in the off position. Conduct procedures outlined in paragraphs 6-9 and 6-14.
- f. The following are procedures to check slave panel wiring harness.
 - (1) Ensure both master and slave panels are properly wired and that master panel power is on.
 - (2) Inspect all wires, terminal lugs and solder points for damaged insulation, breaks, bad connections, and shorts. Intermittent operation so lamps could indicate bad connections or broken wires. Replace or repair wires or connections as required.
 - (3) Open face of slave panel; remove and isolate red/white wire from terminal (3).
 - (4) Perform continuity and resistance checks on all color coded wires from TB 1 to their termination points. All wires should be continuous and have a resistance of < 2 ohms. Wires should not be shorted to each other or the panel. Repair or replace defective wires.
 - (5) If lamps on the slave panel still do not light, perform procedures of 6-11 and 6-12.

6-12 TEST/REPAIR TERMINAL BOX.

- a. Place master panel circuit breaker CB1 in off position.
- b. Remove terminal box cover.
- c. Replace all damaged wires.
- d. Replace broken lugs and broken or loose wires.
- e. Check all terminal nuts, tighten or replace as required.
- f. Ensure terminal boards are securely fastened.
- g. Check for cracks, breaks, broken, or damaged barriers.

TEST/REPAIR SLAVE PANEL.

WARNING

Power is supplied to the slave panel during this process. Extreme care must be exercised while performing this procedure to prevent electrical shock. Follow all required precautions and tagging procedures.

6-14 TEST/REPLACE MASTER AND SLAVE PANEL LAMP TEST SWITCH.

- a. Place master panel circuit breaker CB1 in off position.

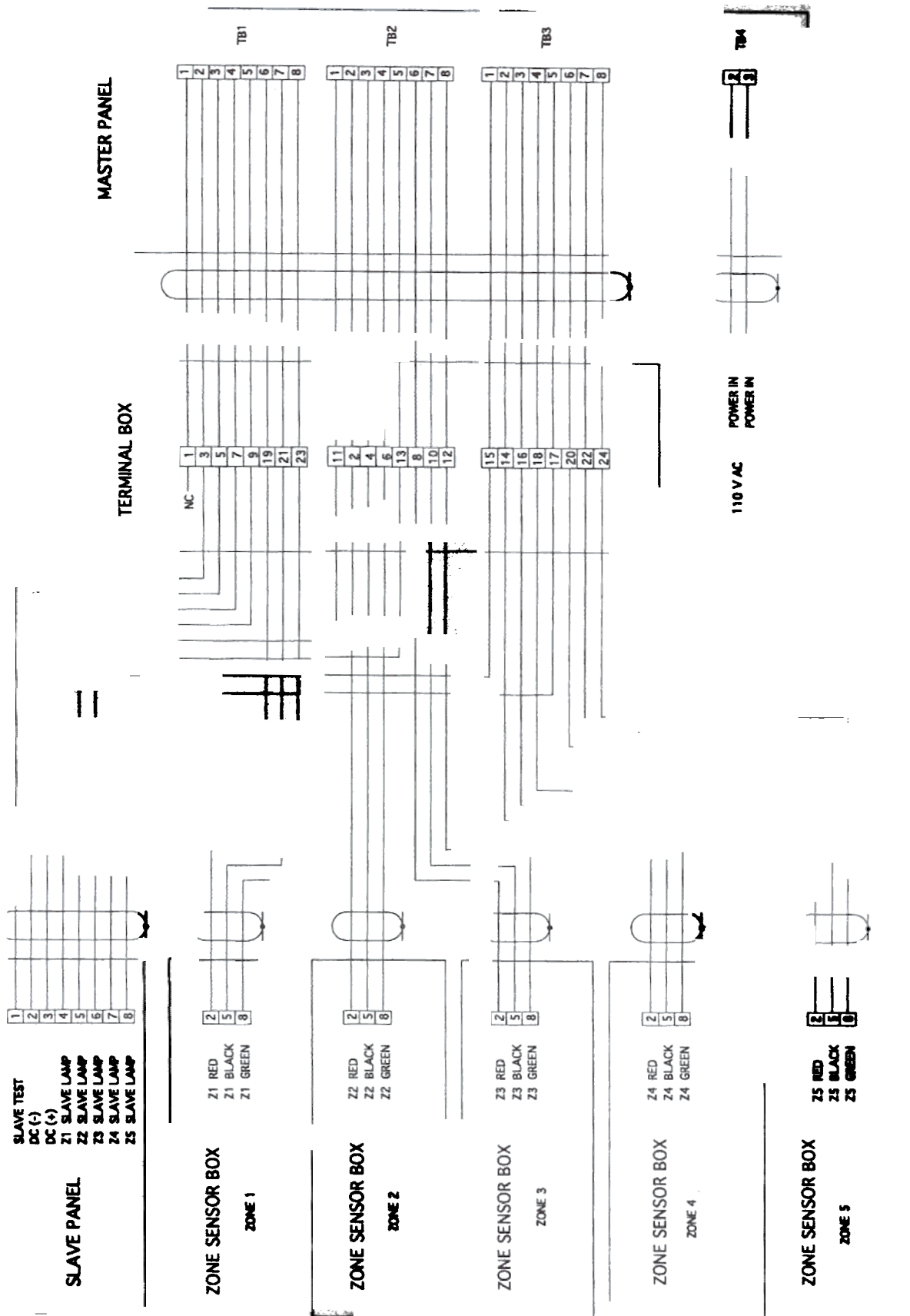


Figure 6-10. Alarm System Schematic

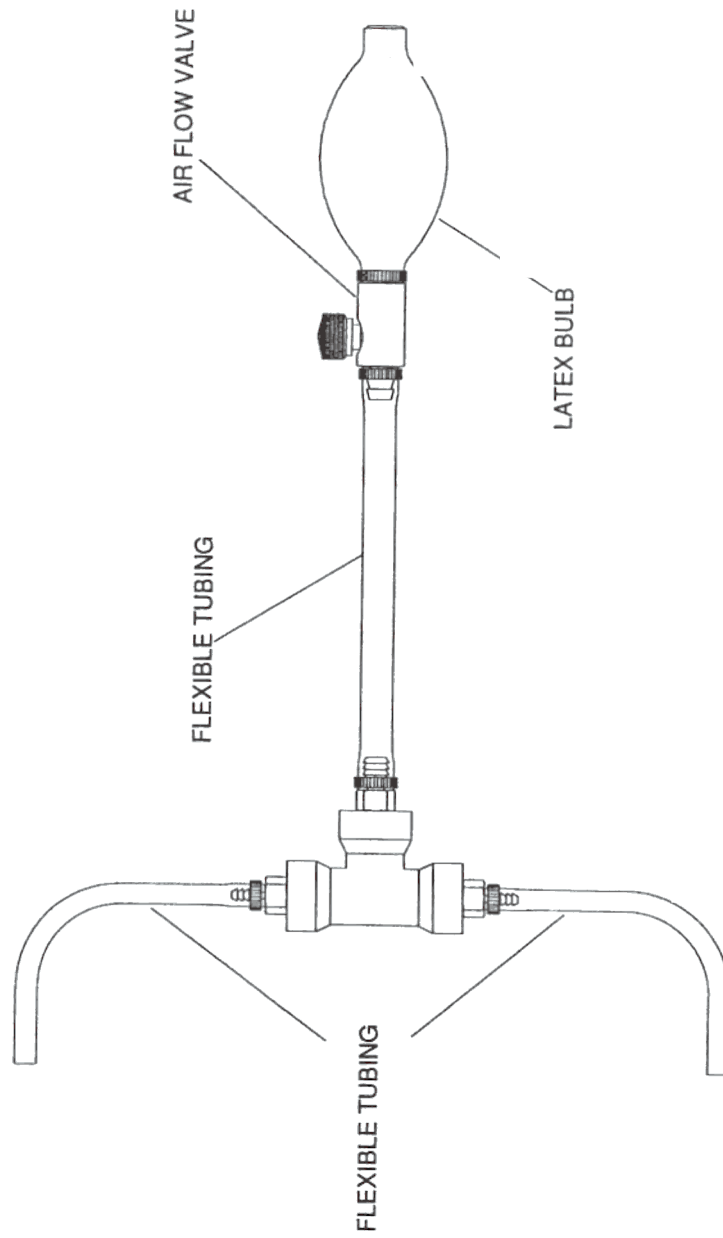
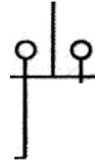


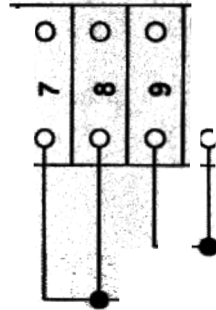
Figure 6-9. Hand Pressure Pump

EMI

LOAD

POWER
POWER





INPUT

INPUT

SENSE

OUTPUT

END OUTPUT

OUTPUT

OUTPUT

SENSE

POWER SUPPLY



supply

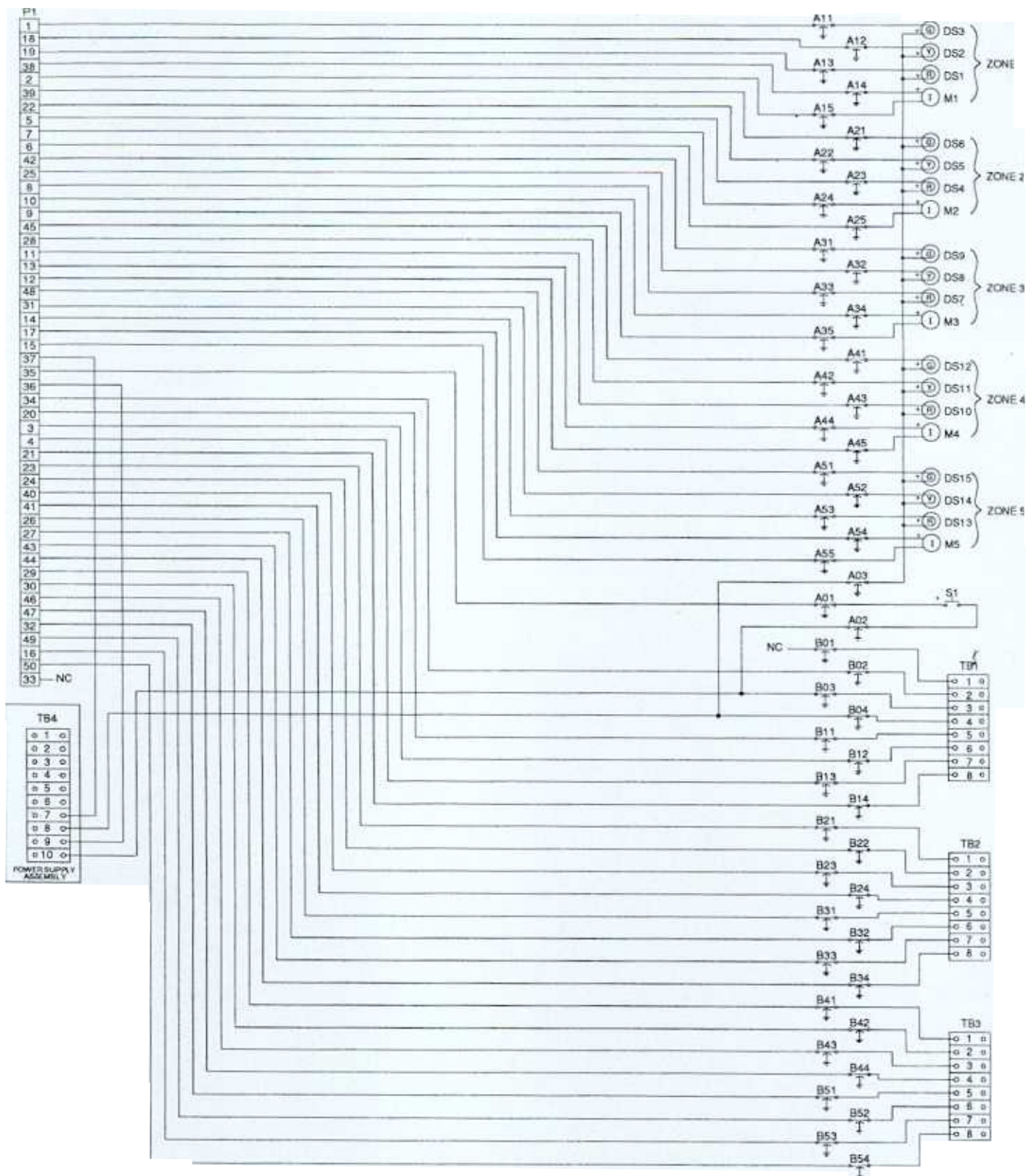


Figure 6-11. Master Panel Schematic

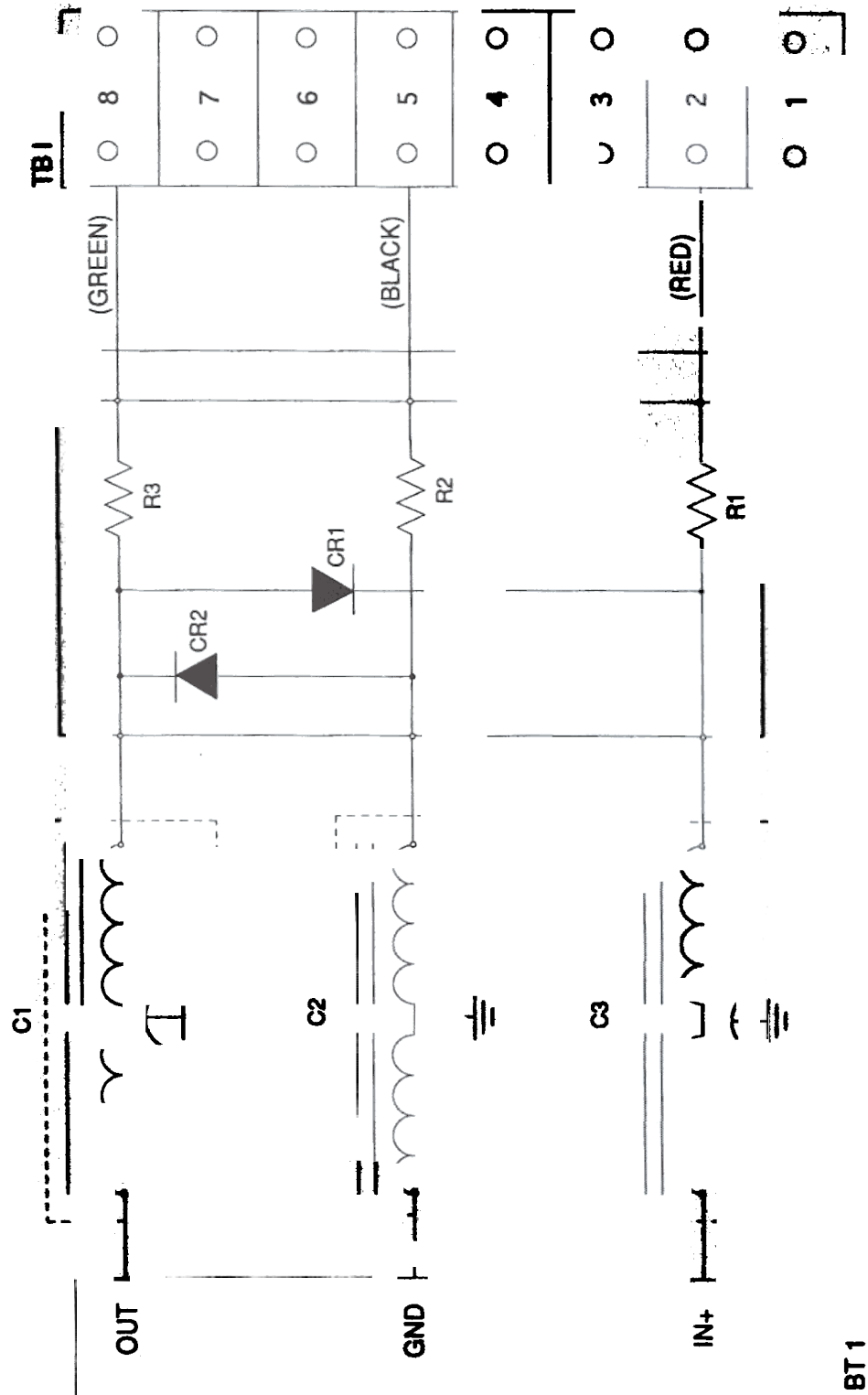
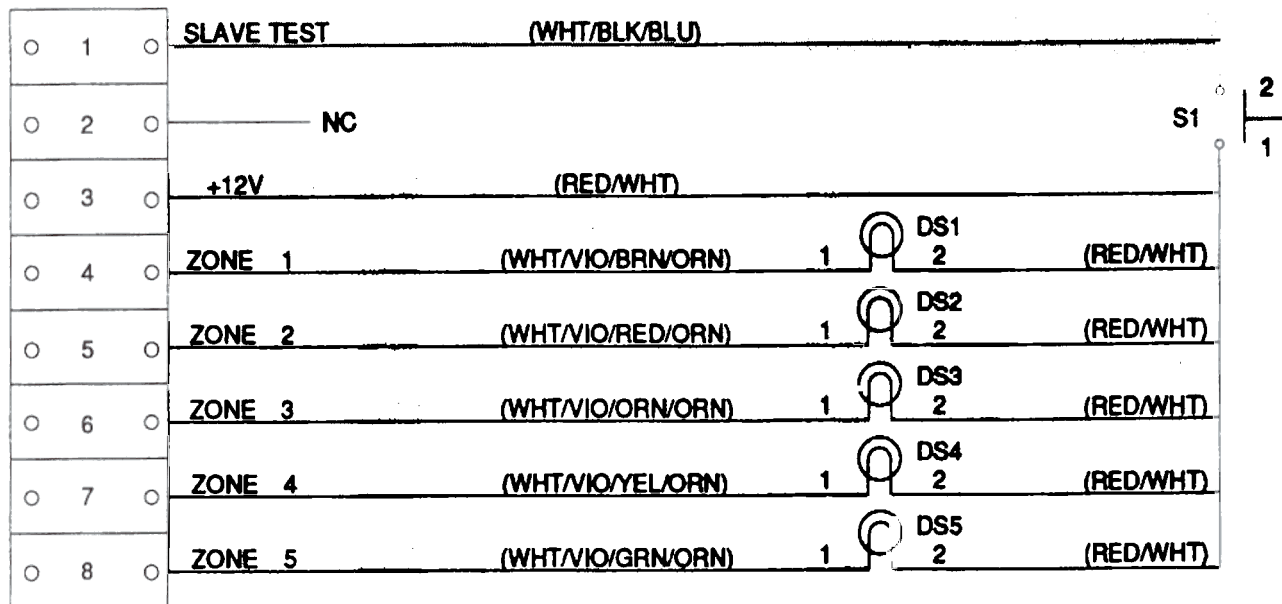


Figure 6-14. Zone Sensor Box Schematic



SS200-AH-MMM-010

Figure 6-13. Slave Panel Schematic

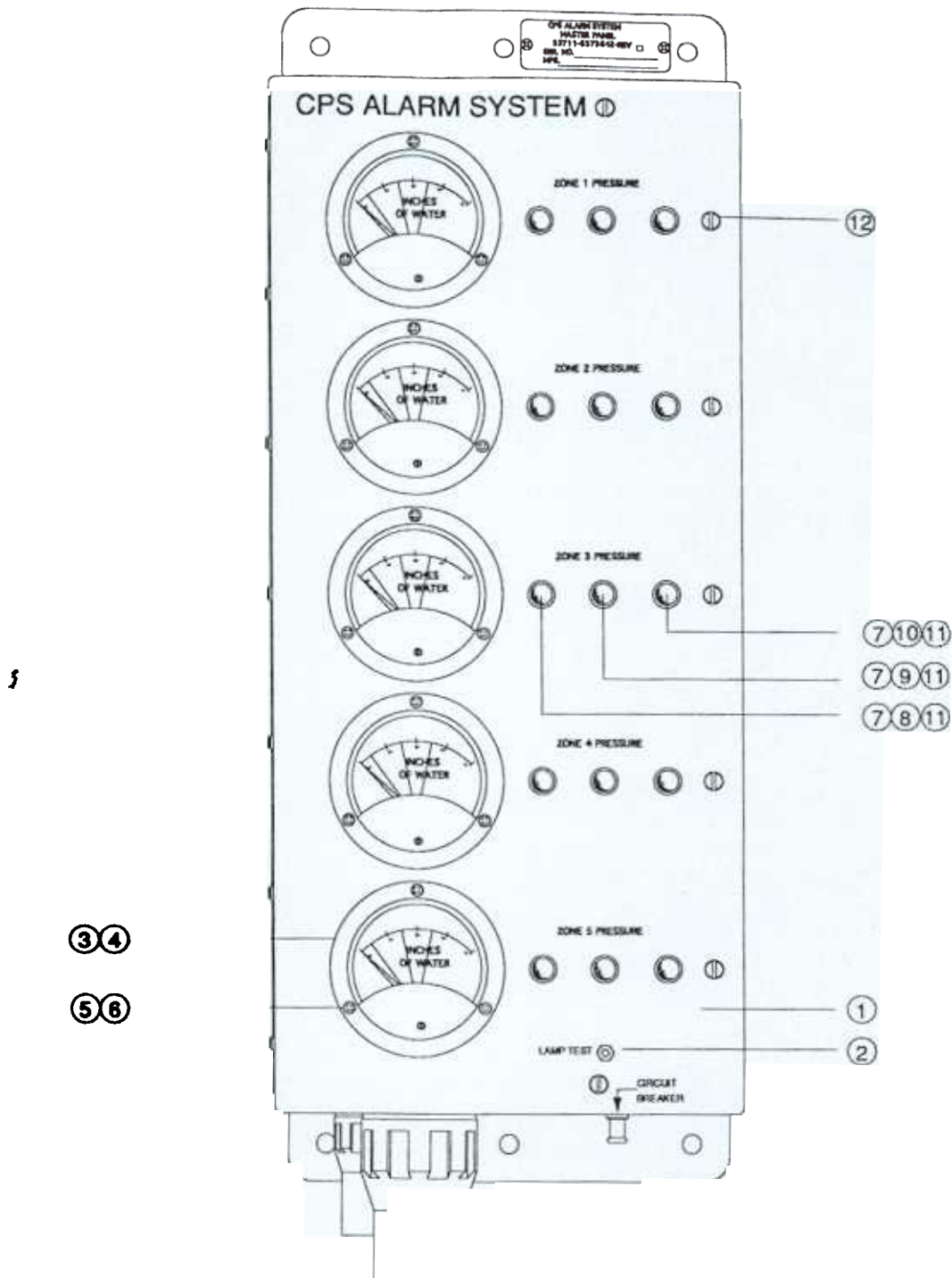


Figure 7-1. Master Panel, Door Closed

Table 7-2. Parts List

Figure & Index No.	Name and Description	Qty	Mfg. Code	Mfg. Part No.
7-1-1	Master Panel	1	53711	6573642
7-1-2	Switch, Lamp Test, Mil-S-8805/96, M8805/96-013	1	-	-
7-1-3	Meter, Panel	1,2,3,4,5	53711	6264202
7-1-4	Gasket, Meter	1,2,3,4,5	53711	6264410
7-1-5	Screw, PNH, Cr Rec, .138-32 UNC, MS35206-230	3,6,9,12,15	-	-
7-1-6	Washer, Lock-Spring, .138 nom., MS35338-41	3,6,9,12,15	-	-
7-1-7	Lamp, Incandescent, W-L-00111/77, Trade No. 345	3,6,9,12,15	-	-
7-1-8	Lens, Red, Mil-L-3661/12, LC12RN2	1,2,3,4,5	-	-
7-1-9	Lens, Yellow, Mil-L-3661/12, LC12YN2	1,2,3,4,5	-	-
7-1-10	Lens, Green, Mil-L-3661/12, LC12GN2	1,2,3,4,5	-	-
7-1-11	Lampholder, Indicator Light, Mil-L-3361/5, LH73/1	3,6,9,12,15	-	-
7-1-12	Screw, Captive	12	-	6573330
	Master Panel, Outer Door Removed			
7-2-1	Filter, RFI, M15733/25-0024	8,12,16,20,24	-	-
7-2-2	Filter, RFI, M15733/61-0002	8,13,18,23,28	-	-
7-2-3	Seal, Cable Entry	1	53711	6574177-3
	Master Panel, Inner Door Removed			
7-3-1	Power Supply Assembly	1	53711	6573634
7-3-2	Screw, PNH, Cr Rec, .250-20 UNC, MS35206-280	4	-	-
7-3-3	Washer, Lock-Spring, .250-nom., MS35338-44	4	-	-
7-3-4	Circuit Card Assembly	1	53711	6573641
7-3-5	Screw, PNH, Cr Rec, .138-32 UNC, MS35206-228	4	-	-
7-3-6	Washer, Lock-Spring, .138 nom., MS35338-41	4	-	-
7-3-7	Screw Lock Assemblies, Male, M24308/25-10F	2	-	-
7-3-8	Screw Lock Assemblies, Female, M24308/26-2F	2	-	-
7-3-9	Seal, Cable Entry	1	53711	6574177-1
7-4-1	Slave Panel	1	53711	6264194
7-4-2	Switch, Lamp Test, Mil-S-8805/96, M8805/96-013	1	-	-
7-4-3	Lamp, Incandescent, W-L-00111/77, Trade No. 345	1,2,3,4,5	-	-
7-4-4	Lens, Red, Mil-L-3661/12, LC12RN2	1,2,3,4,5	-	-
7-4-5	Lampholder, Indicator Light, Mil-L-3361/5, LH73/1	1,2,3,4,5	-	-
7-4-6	Seal, Cable Entry	1	53711	6574177-1
7-5-1	Zone Sensor Box	1,2,3,4,5	53711	6264199
7-5-2	Gauge, Pressure, Differential	1**	53711	6573294-1
7-5-3	Gasket, Pressure Gauge, 15.25" in length	1**	53711	6573550
7-5-4	Screw, PNH, Cr Rec, .190-32UNF, MS35207-264	4**	-	-
7-5-5	Washer, Lock-Spring, .190 nom., MS35338-43	4**	-	-
7-5-6	Seal, Cable Entry	1**	53711	6574177-1
7-5-7	Connector, Bulkhead, Female	2**	53711	6573292
	Zone Sensor Box, Door Open			
7-6-1	Connector, Hose to Male Pipe	6**	53711	6573293
7-6-2	Tape, Antiseize, Mil-T-27730, Size I	AR	-	-
7-6-3	Filter, In-Line Pneumatic	2**	53711	6573291
7-6-4	Tube, PVC, Flexible, .125 ID x .06 wall, L-T-790	AR	-	-
7-6-5	Pressure Transducer Assembly	1**	53711	6573709
7-6-6	Screw, PNH, Cr Rec, .138-32UNC, MS35206-228	4**	-	-
7-6-7	Washer, Lock-Spring, .138 nom., MS35338-41	4**	-	-

**Quantity per Zone Sensor Box

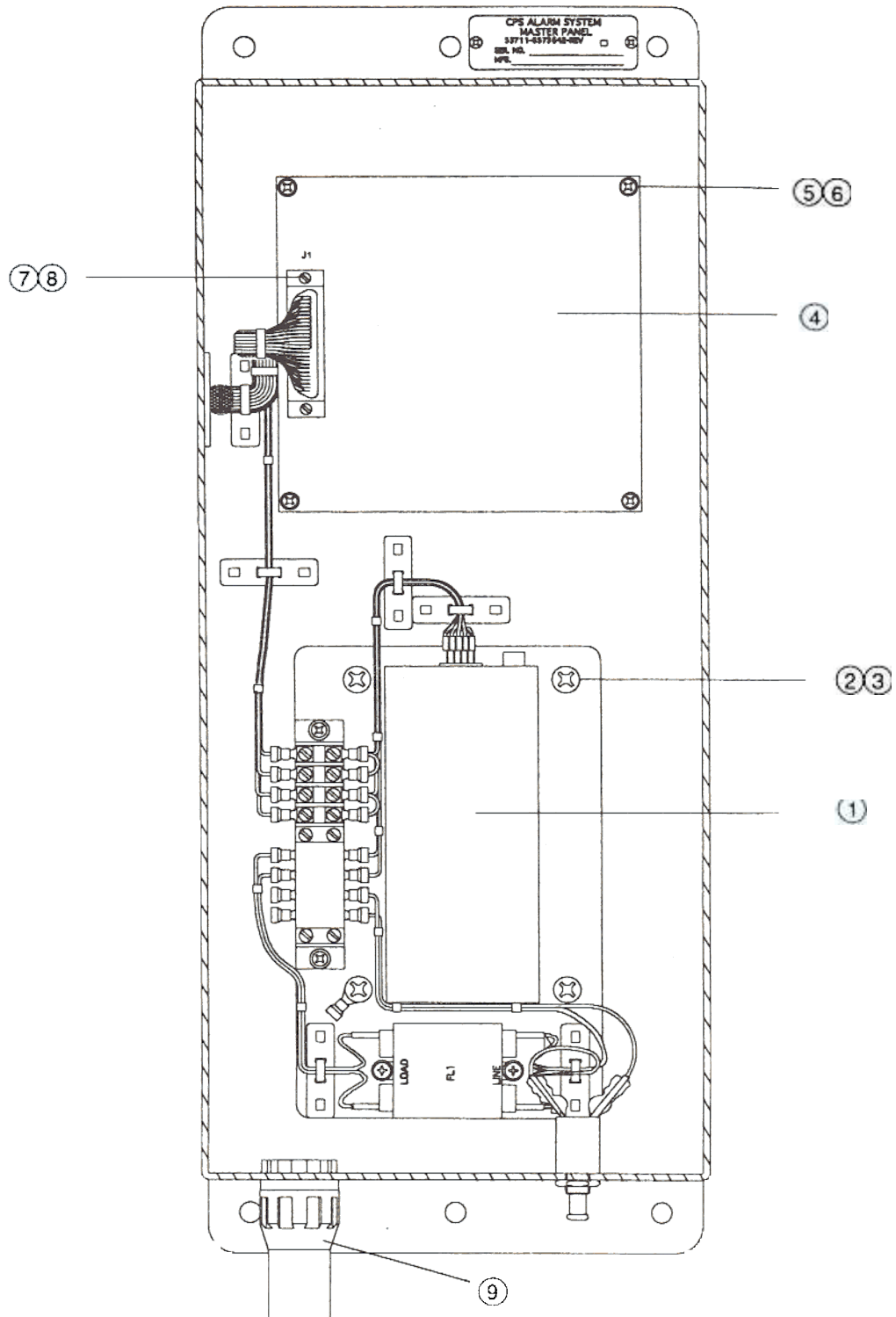


Figure 4-3. Master Panel Inner Door Removed

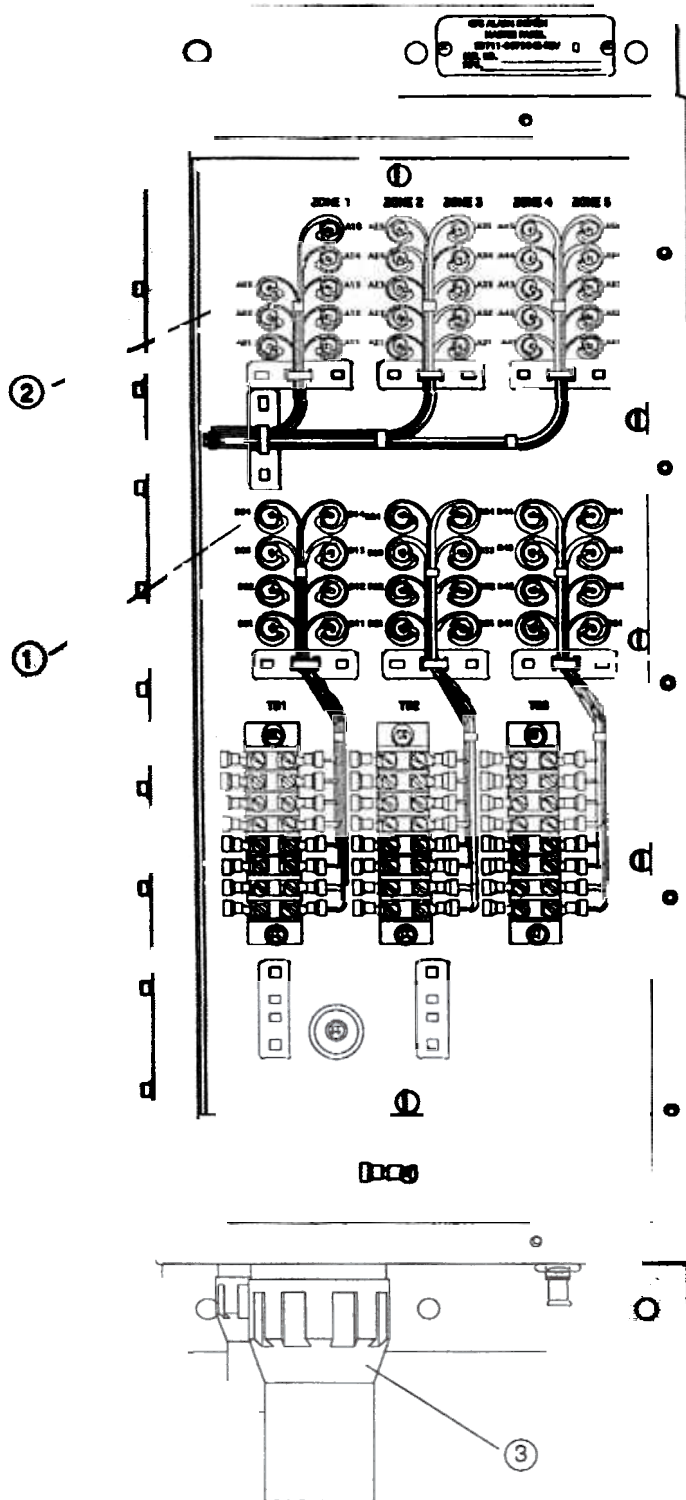


Figure 7-2. Master Panel, Outer Door Removed

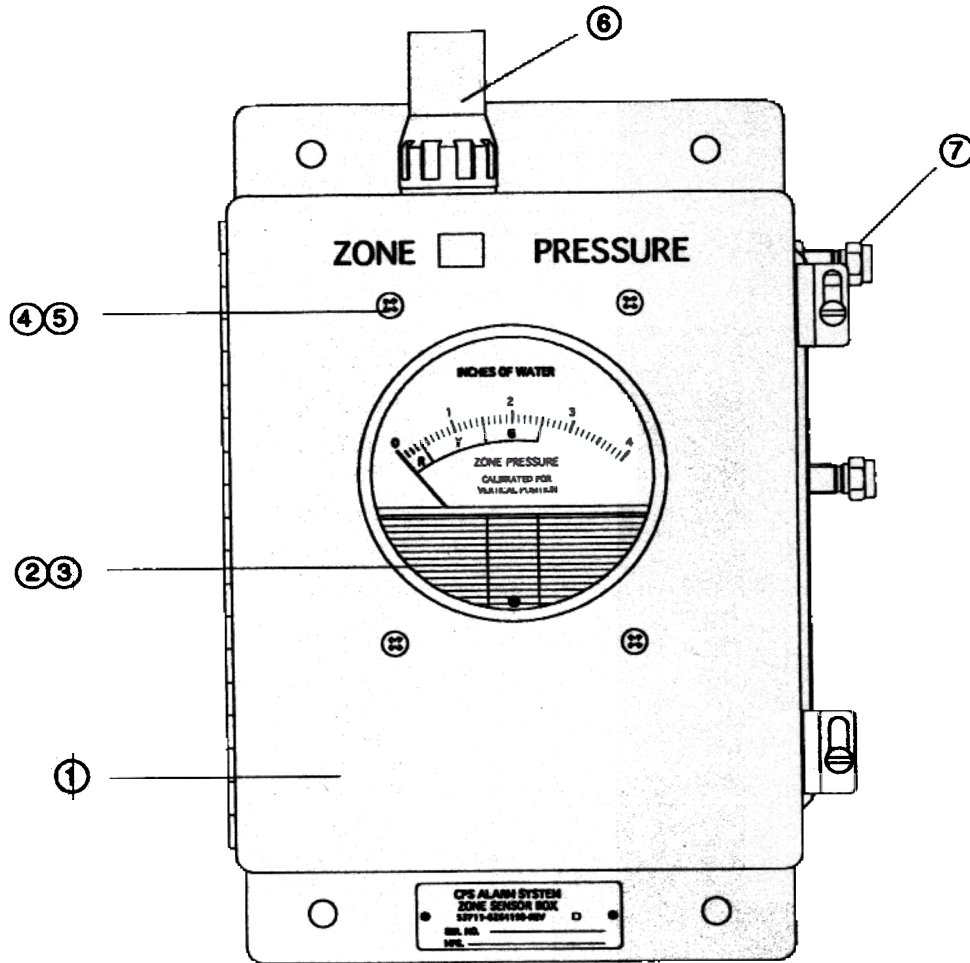


Figure 7-5. Zone Sensor Box, Door Closed



CPS ALARM SYSTEM



LAMP TEST



(3)(4)(5) < #

Slave Panel Door Closed

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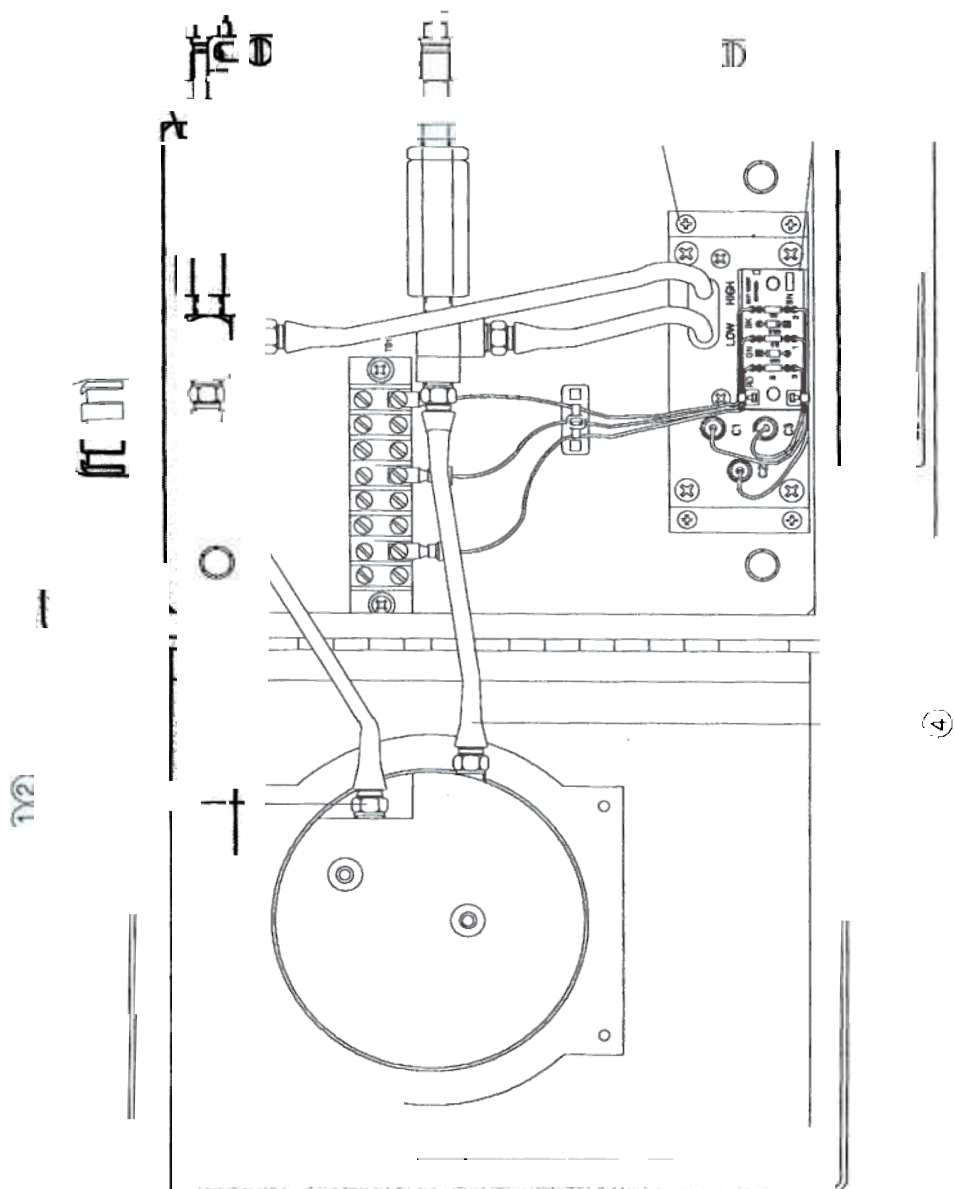
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CHAPTER 7

PARTS LIST

7-1 INTRODUCTION

This chapter identifies and illustrates the parts that comprise the Collective Protection System (CPS) Alarm System. It contains a list of major components (table 7-1) and a parts list (table 7-2) cross-referenced to the applicable parts location illustration (figures 7-1 through 7-6). All alarm system repair and replacement parts, except attaching parts, have unique functions; therefore, a list of common item description is not provided. Also, since all attaching parts are identified by military specification (MS) number on the parts list, a separate list of attaching parts is not provided.

7-2 LIST OF MAJOR COMPONENTS.

Table 7-1 lists the major components of the alarm system.

Table 7-1. List of Major Components

Unit No.	Quantity	Name
1	1	Master panel
2	1	Slave panel
3	1 per zone	Zone sensor box
4	1	Terminal box
5	1*	Static air probe

*More than one may be used

7-3 PARTS LIST.

Table 7-2 provides an indentured listing of each part used on the alarm system. It contains the following information for each part.

- a. Column 1, Figure and Index Number: This column contains the figure and index numbers of the parts location illustration(s) containing the part.
- b. Column 2, Name and Description: This column contains the name of the part and descriptive data to identify the part, such as the MS number, physical characteristics (material, dimensions, grade, etc.), or any other information to aid in part replacement. An asterisk in this column indicates that the part is not replaceable.
Column 3, Quantity: This column indicates the quantity of parts required per alarm system assembly. Multiple numbers in this column for an item means the number per zone. For example, "Meter, panel 1,2,3,4,5" would mean one meter for a one zone system, two for a two zone, etc. The abbreviation AR means as required.
- d. Column 4, Mfg. Code: This column contains the original part manufacturer's federal supply code identification number. Codes are not provided for common hardware items (screws, washers, O-rings) that are available from many sources. However, these parts are identified in column 2 by MS number.
Column 5, Mfg. Part Number: This column lists the part number assigned by the original manufacturer of the part. Part numbers are not provided for common hardware items that are available from many sources.

7-4 LIST OF MANUFACTURERS.

The manufacturer code 53711 in column 4 of table 7-2 represents the Department of the Navy, Naval Sea Systems Command, Washington, DC 20362.

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